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Centre for Trade Facilitation and Electronic Business

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Item 5 of the provisional agenda
Reports of rapporteurs

Report of the Rapporteur for Africa

I. Introduction

1. The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) Rapporteur for Africa has conducted several activities to promote UN/CEFACT work and e-commerce throughout Africa. This report contains the activities of the Rapporteur and the activities of the African Alliance for Electronic Commerce (AACE), which is the formalized organization dealing with trade facilitation and Single Window in the African region.

II. Activities conducted by the Rapporteur

A. Participation at the 29th UN/CEFACT plenary and forum, March 2017, Geneva

2. During the Geneva UN/CEFACT forum, Cameroon, Morocco, Nigeria and Senegal participated. Initial discussion for the Single Submission Portal (SSP) project were conducted. More and more interest and involvement for UN/CEFACT works it noted by African countries through the continuous involvement of AACE in UN/CEFACT activities and both side.

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B. Participation at the Global E-Commerce Summit, 12-14 June 2017, Barcelona

3. ECommerce Foundation organized a workshop alongside the E-Commerce Summit to launch the concept of the Safe.Shop label. The Rapporteur was invited to present the situation of African e-commerce. The label was initiated to allow Small and Medium-sized Enterprises (SMEs) to better perform in e-commerce and to overcome the challenge of trust. More than 10 countries throughout the world have expressed interest in this initiative. The initiative went live last quarter.

C. Participation at the Digital Trade-Related Provisions in Regional Trade Agreements: Existing Models and Lessons for the Multilateral Trade System Dialogue Series, 13 July 2017, Geneva

4. The Rapporteur was invited to make a presentation on the situation of e-commerce in Africa. This meeting was organized by the International Centre for Trade and Sustainable Development (ICTSD) based in Geneva. The Rapporteur has focused his interventions on the obstacles to the expansion of e-commerce in Africa and the recommendations to improve the situation.

D. Participation at the 10th West Africa Internet Governance Forum, organized by the Economic Community of West African States (ECOWAS) 27- 28 July, Benin

5. A paper on e-commerce was prepared by the Rapporteur of E-commerce. The West African countries have discussed many areas of the digital economy which should be handled jointly. The secretariat of ECOWAS is motivated to promote the digital economy of the 15 member countries of the regional economic commission of West Africa.

E. Participation in the UNCTAD workshop on e-commerce, 24-28 April 2017 in Geneva

6. This is the second time the Rapporteur has attended the United Nations Conference on Trade and Development (UNCTAD) E-Commerce Week. This time the AACE was invited to collaborate with UN/CEFACT in organizing a Special Session on the 28th, at the same venue, called "Single Window as an Enabler for E-Commerce Development".

7. The session involved the participation of the new Chairman of the AACE, Isidore Biyiha, and other AACE experts involved as speakers and moderator.

8. A new version of the Single Window implementation guidelines was launched during the event and hard copies of the guide were distributed to the audience.

9. The e-commerce week was attended by AACE and some of its members, Kentrade, the Conseil National des Chargeurs de Cameroun (CNCC), and GAINDE 2000.

F. Participation at the World Trade Organization 2017 Public Forum under the theme "Trade: Behind the Headlines", 26-28 September, Geneva

10. The Rapporteur was invited by the Minister of Commerce of Senegal to join the Senegalese delegation and to present on Senegalese digital trade facilitation initiatives in a special session dedicated to Senegal. There was a large attendance and the presentation was chaired by the Minister with the participation of senior customs managers.

G. Participation at the 30th UN/CEFACT Forum in Rome, 2-6 October 2017 (Italy)

11. During the Rome forum the Rapporteur actively participated in the session dedicated to Blockchain. A presentation was made by a Senegalese expert. During the forum the SSP recommendation project held its first meeting. A session focused on the review of another project related on the Core Principles of Single Window Operations, and many inputs were suggested. Morroco and Sengal participated for the African region.

H. Participation at the "Assises de la transformation digitale": the key to successful digital transformation, Abidjan, 27-28 November 2017

12. During this major African event on digital transformation, the Rapporteur was invited in (2 respective sessions) to address the issue of funding the digital economy of Africa, and trade facilitation issues in connection with the digital era. Remy Marchand was the moderator of the trade related session, where UN/CEFACT standards were discussed together with Blockchain logistics.

I. Participation at the World Trade Organization (WTO) Ministerial Conference 11: Advancing Trade Facilitation and Paperless Trade for sustainable growth, 11-13 December 2017, Buenos Aires, Argentina

13. The Rapporteur was invited by the Government of Senegal and the ICTSD to participate in a panel dedicated to e-commerce in the WTO negotiation. The discussion was very interesting, and many African delegations attended the session.

J. Participation at the UN/CEFACT symposium on Single Window and the Trade Facilitation Agreement (TFA), Geneva, 30-31 October 2017

14. Invited by UN/CEFACT to speak, the Rapporteur and AACE attended the third symposium to discuss of some variations of Single Window implementations and how they align with the UNECE Recommendation 33 definition. A presentation was done by the Vice President in charge of Promotion. He shared with participants various AACE Single Window experiences.

K. Launch of the African Performance Institute

15. The Rapporteur for Africa launched a new initiative called the African Performance Institute dedicated to the digital transformation of Africa. A cycle of 6 high-level conferences were conducted in Senegal. One was dedicated to e-commerce, and the

Minister of commerce attended. The objective is to advocate for senior policymakers in Africa to make better choices regarding digital transformation and to increase the global performance of Africa.

III. Activities conducted by the African Alliance for e-commerce

A. Organization of the 8th AACE General Assembly on 14-15 March 2017 in Nairobi, Kenya

16. The AACE held its 14th Executive Committee and 8th General Assembly meetings from 14 to 15 March 2017 at the Radisson Blu Hotel in Nairobi Kenya, under the chairmanship of the AACE Chairman, Mr Ibrahima Nour Eddine DIAGNE and Chairpersons Mr. Isidore BIYIHA, Mr. Jalal BENHAYOUN and Mr. Amos WANGORA.

17. On the side-lines of the meetings, a workshop on trade facilitation was held. This forum was attended by diverse stakeholders from various public and private sectors. The major role that Single Window could play in the implementation of Trade Facilitation Agreement (TFA) and the Boosting Intra-African Trade (BIAT) action plan were discussed.

18. These meeting resulted in the election of new office bearers (for a period of two years). The GUCE (Cameroun Single Window) Director General, Mr. Isidore Biyiha became the President of the AACE Executive Committee, while the CEO of KenTrade Kenya, Amos Wangora, was elected the President of the General Assembly. Representatives of the Congo, Cote d'Ivoire, Ghana, Morocco and Senegal were elected as Vice Presidents.

B. Participation at PACCI meeting May 22nd – 23rd, 2017, Addis Ababa

19. The Pan African Chamber of Commerce and Industry (PACCI) organized a workshop under the topic "Enabling Cross Border Trade - Ways chambers of commerce can lobby in support of the Single Window".

20. This meeting was attended by delegates from the Republic of Congo, Madagascar and the Secretariat. Presentations on AACE e-commerce projects were made by representatives from the Central African Economic and Monetary Community (CEMAC) and the West African Economic and Monetary Union (WAEMU).

21. During the discussion, PACCI emphasized the importance of finding areas of collaboration with AACE.

22. The meeting brought together a wide range of participants, including Government officials, representatives from business circles, customs officials, corridor management, port authorities as well as representatives from related regional and international organizations.

C. Participation in the Port Management Association of West and Central Africa conference in Cotonou, 24-26 July 2017

23. AACE took part in the conference organized by the Port Management Association on the Single Window and Port Community System, held from 24 to 26 July 2017 in Cotonou, Benin.

24. The workshop was attended by GAINDE 2000[1] (Senegal), GUOT[2] (Republic of Congo) and GUCE[3] (Cote d'Ivoire). During the workshop, AACE made a presentation emphasizing the importance SW systems.

25. The conference aimed to provide a deeper understanding of the subject and assess the lessons learned from countries that have already deployed these tools (Single Window/Port Community System).

D. Participation at the 4th Technical Working Group meeting on interconnectivity of computerized Customs Clearance and Information Systems in Africa

26. From 31st July to 02 August 2017 at the Hilton Hotel in Yaoundé, Cameroon, the African Union Commission (AUC) invited AACE to the 4th Technical Working Group meeting on interconnectivity of computerized Customs Clearance and Information Systems in Africa. The meeting was attended by Morocco and Cameroon. A presentation was made on AACE projects which aligned with the main topics (e-commerce, Africa Trade portal, etc.).

27. During the discussion, the draft Memorandum of Understanding (MOU) between the AUC and the AACE was discussed, and the AUC were informed that the revised version would be sent to Director Generals of the member states for further comments so that the MOU could be signed before the end of 2017.

E. Participation at the WCO workshop on Digital Customs and E-Commerce from 21 to 24 August 2017 in Ouagadougou, Burkina Faso

28. The World Customs Organization (WCO) and Burkina Faso Customs Administration organized a Regional Workshop on Digital Customs and E-Commerce from 21 to 24 August 2017 in Ouagadougou, Burkina Faso. Cameroon represented the AACE and a presentation was made on SW and e-commerce platforms.

29. It is important to note that the AACE has been an active actor in the WCO e-commerce reflection since its first initial workshop on the topic.

F. Holding of the annual International Single Window Conference, from 3rd -5th 2017 at hotel Kempinki, Accra, Ghana

30. Organized by the Africa Alliance for Electronic Commerce (AACE), in partnership with the Ghana Community Services Network (GCNet), Ministry of Trade and Industry (MOTI) and the Ghana Revenue Authority (GRA), the official Opening Ceremony ocurred in the Kempisky Hotel, Accra. The programme line-up involved important dignitaries and was graced by His Excellency the Vice President of Ghana, Alhaji (Dr.) Mahamadu Bawumia.

31. Attended by more than 200 participants from various entities including public, private and partners (WTO, WCO, African Union (AU), Economic Commission for Africa (ECA), Common Market for Eastern and Southern Africa (COMESA), WAEMU,

[1] The custom Single Window systems provider for Senegal.

[2] GUOT is the acronym for single window customs system used in Republic of Congo.

[3] The National Single Window for Foreign Trade in Ivory Coast.

Universal Postal Union (UPU), WEF, Economic and Social Commission for Asia and the Pacific (ESCAP), UN/CEFACT) the conference raised certain points related to the development of e-commerce, Single Window, and TFA implementation, such as:

- The need for a clear definition of community systems in order to address issues involved in all clearing services advocated;
- Modules of the SW Concept are explained, but there are different challenges in different countries which need to be defined;
- Governments must be fully committed with a sanctions regime instituted for users in order to move from SW to e-Commerce; the AACE should serve as relay to disseminate all these principles to member states;
- Technology is a key enabler and a key differentiator in the success of any supply-chain system. Its improvement is therefore a very important component in the global development of e-commerce;
- There is a need for an efficient address system if e-commerce is to succeed;
- A great challenge to internet connectivity is that data generated by Africa is given away freely; member states should begin to think about how the data generated can be equitably shared; data has become a lubricant for the global economy;
- Consider holding a stakeholder Business Processes Conference to deal with frustrations; a lot of Business Processes Engineers should come on board;
- The need for the integration of SW Concepts among member states should be emphasized;
- Border operation standards need to be harmonized; the need for one-stop border post is complex, but necessary;
- A legal framework is required to compel members to register and implement SW; only 22 AU members have registered;
- The integrity of platforms depends on the integrity of data; punitive regimes must be instituted to deter declarants from inputting incorrect data;
- Easy-to-use and secure payment systems (Banks, mobile phones) are an important component of efficient e-Commerce;
- There should be adoption regulations for e-commerce, both at the national and global levels;
- Change management is essential if operators are to survive in the dynamic world of e-commerce; attitudinal change is imperative;
- Efficient infrastructure is a fundamental requirement in order to harness e-commerce;
- It is important to invite government agencies responsible for postal services to be a part of discussions;
- Industry players should have no choice but to adopt global e-commerce solutions;
- A recommendation should be made for the establishment of one global hub where all the participating countries would sign on for e-commerce;
- There is a need to institute risk-management strategies to curb the incidence of illicit goods transportation;

- Consider the institution regulatory prohibitive policies to prevent the dumping of e-waste in Africa;
- Initiate programmes to connect Customs agencies to the relevant portals to make their work more efficient;
- Improve transport infrastructure to facilitate trade;
- Regional Integrations Communities (RICs) should dialogue to ensure unity;
- AACE should approach member states individually to dialogue for unity.

32. The AUC has agreed, in principle, that a framework for cooperation on e-commerce will be introduced as a subject in the second phase of the Continental Free Trade Area (CFTA) negotiations. AACE is called upon to work with the AUC, ECOWAS, member states and Regional Economic Communities to contribute to the design of the e-commerce framework for cooperation.

G. Invitation to the Continental Dialogue on the contribution of Preferential Trade Agreements (PTAs) 23-24 October 2017, Yaoundé, Cameroon

33. African Alliance participated as speaker to the continental dialogue on the contribution of PTAs organized by the African Trade Policy Centre (ATPC). A presentation focused on the AACE views on informal trade and how electronic systems could fight against informal trade practices.

H. UNECE-ESCAP-EEC International Single Window Conference, Moscow 7-8 December 2017

34. From 7 to 8 December 2018, AACE participated as speaker at the International Single Window Conference in Moscow. During that event AACE shared African perspectives on Single Window.

I. Participation at the meeting on the Electronic certificate of origin and TFA measures, Ouagadougou 20-23 November 2017

35. Following a study on the legal framework of the certificate of origin implementation, WAEMU Commission, in partnership with the International Trade Centre (ITC), organized a workshop to share the results of the study with all stakeholders involved in the electronic issuance of the certificate of origin. The meeting has enabled WAEMU and AACE to follow their common action plans to generalize the e-certificate of origin in the eight member countries.

IV. AACE Partnership with international organizations

A. African Union Commission (AUC)

36. Considering that AACE plays a central role in the promotion of activities related to trade facilitation and Single Window implementation in Africa, the AUC intends to sign a Memorandum of Understanding (MoU) with the AACE to strengthen the capacities of countries in their Single Window projects. This MoU should enter into force in 2018.

B. Afreximbank

37. Having the common objective of promoting intra-African Trade, the African Export-Import Bank (Afreximbank) is in discussion with AACE in order to identify projects that both entities could implement together. During a meeting organized on side-lines of the Single Window Conference, held in Accra, the two organizations identified the e-commerce sector as an area for collaboration. Afreximbank is a Pan-African institution, established in 1993, whose objective is the financing and promoting of intra- and extra-African trade.

V. Project and perspectives in 2018 for AACE and African Performance Institute (API)

A. Generalization of the E-Commerce pilot project of WAEMU

38. Thanks to financial support from WAEMU, AACE will organize in 2018 the second step of the project. It aims to organize awareness workshops and set up the e-commerce platform in the eight of the member countries. The final objective of these activities will be to dematerialize the WAEMU certificate of origin in all eight countries by the end of 2018.

B. Extension of sensitization workshops on the concept of Single Window in six African countries belonging to the Least Developed Countries (LDC)

39. With the support of the Economic Commission for Africa and the African Trade Policy Centre, AACE will organize six awareness workshops on the Single Window concept in six African LDC countries. With the entry into force of the TFA, these workshops will be a framework for discussion of certain TF articles related to the agreement.

C. African Performance Institute

40. The African Performance Institute will continue its efforts in Senegal and will push for expansion into other African countries.

VI. Conclusions and recommendations

41. The next year will be dedicated to the implementation of many regional projects and the continuation of the advocacy role of both AACE and API.

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Recommendations and standards: Other deliverables for noting

Report of the Rapporteur for Asia and the Pacific

I. Introduction

1. This is the report of the Rapporteur for Asia and the Pacific, covering several important sessions on trade facilitation in the region since the twenty-third session of the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) Plenary in April 2017.

2. The main focus in the Asia-Pacific region is that of data communication occurring smoothly, cost-effectively and safely between trading partners and related stakeholders—especially given the growth of global supply chains utilizing e-business, including e-mobile business. There are many challenges in creating and developing the information and communication technology infrastructures and networks that play an important role in governing high-level, transparent, global supply/value chains. The countries and regional bodies in the Asia Pacific region continue their efforts to materialize the potential of electronic business and trade facilitation for regional development.

II. Year 2017 annual activity of the Asia Pacific Council for Trade Facilitation and Electronic Business (AFACT)

3. AFACT is positioned to play a very important role in promoting trade by integrating electronic business using international standards and best practices—especially those developed and promoted by UN/CEFACT—in the Asia Pacific region. Most of the active members of AFACT have continued to pursue joint activities over the last year, to the benefit of all member countries.

4. All members look forward to developing ways to both collaborate in e-commerce and to increase adaptability and flexibility in a non-political environment. As of 2017, AFACT had 20 members (Afghanistan, Australia, Bangladesh, Cambodia, China, India,

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Indonesia, Iran, Japan, Korea, Malaysia, Mongolia, Pakistaa, the Philippines, Singapore, Sri Lanka, Saudi Arabia, Thailand, Viet Nam and Taiwan Province of China), a liaison member in the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and an associate member in the Pan Asian e-commerce Alliance (PAA).

5. Each member assigns a Head of Delegation (HoD) and each liaison member and associate member assigns a representative to participate in AFACT meetings.

6. Every year, one HoD is chosen to host and chair the annual meetings. The host for 2017 was Taiwan Province of China and the host for 2018 is Bangladesh.

7. In 2018, Iran will take on the role of permanent secretariat to support the host HoD.

A. The structure of AFACT

8. A Steering Committee (StC) for managing, coordinating and promoting AFACT activities is convened whenever necessary in web-conference format, and in two face-to-face annual meetings.

9. The StC is composed of the host member HoD, last and next years' host HoDs, two elected HoDs, committee chairs, the permanent secretariat, a UN/CEFACT Vice Chair, the UN/CEFACT Rapporteur for Asia and the Pacific and the representative of ESCAP.

10. Three Executive Committees (ECs) have been formed to undertake concrete work: a Business Domain Committee (BDC), a Technology and Methodology Committee (TMC) and a Community Support Committee (CSC).

11. Working groups (WGs) have been formed within the ECs for the following subjects: Travel, Tourism and Leisure (TT&L) and Cross-Border eMarketplace (CB eMP) within BDC.

12. AFACT is a liaison member of ISO/TC154[1] and full member of UNTDED-ISO 7372 Joint Maintenance Agency[2].

B. AFACT annual meetings

13. A mid-term meeting in the first half of the year and a plenary in the latter half of the year are held annually. All members are welcome to attend, share experiences and knowledge and identify key strategic issues.

14. In 2017, AFACT annual meetings were held as follows:

- The 35th Mid-term meeting: Tamsui (New Taipei City), Taiwan Province of China, 19-21 April 2017;
- The 35th Plenary meeting: Taipei City, Taiwan Province of China, 11-13 September 2017.

15. In 2018, AFACT annual meetings are planned as follows:

- The 36th Mid-term meeting in Bangladesh during the second quarter of 2018;
- The 36th Plenary meeting in Bangladesh during the fourth quarter of 2018.

[1] http://www.isotc154.org/.

[2] https://www.unece.org/tradewelcome/un-centre-for-trade-facilitation-and-e-business-uncefact/outputs/standards/untded-iso7372/introducing-untded-iso7372.html.

C. Topics of AFACT activities

(i) Reporting of progress in UN/CEFACT Forums

16. The Rapporteur provided a report on the activities of the UN/CEFACT 29th and 30th Fora at the AFACT Mid-term and Plenary meetings, which also covered mini-conferences featuring key themes, as well as continuing and newly started projects under related UN/CEFACT Programme Development Areas and Domains. Experts who participated in the relevant UN/CEFACT Fora reported in detail on the above in both the TMC and BDC sessions.

(ii) Aiming toward progress in Trade Facilitation and e-Business

- Travel, Tourism and Leisure (TT&L) Working Group
- Cross-Border eMarketplace (CB eMP) Working Group
- Electronic Phytosanitary certificate

(iii) eASIA Awards 2017

17. The eASIA Awards ceremony is carried out every two years at the same time as the annual Plenary. It is administrated by the relevant AFACT host member. The event promotes the achievement of AFACT member countries/economies in the development of trade facilitation, electronic business policies and practices, and initiatives for bridging the digital divide in the Asia-Pacific Region. The purpose of the eASIA Awards is to recognize the significant efforts made within the AFACT community and to encourage the exchange of best practices. The event also intends to develop mutual understanding and experience sharing between member countries/economies by displaying the shortlisted projects in the eASIA Awards Exhibition.

18. proposals from 6 member countries/economies were submitted to the AFACT Evaluation Committee (EC). After evaluation, 11 of the projects were placed on the semi-final list. After final evaluation, the following projects won awards in each of the four categories:

(a) Trade Facilitation and eCommerce:

- Gold Award: Shenzhen Cross-border E-commerce Credible Transaction Security System (project of China);
- Silver Award: Postal Cash Card: Banking for the Unbanked People (project of Bangladesh).

(b) Open Digital Government:

- Gold Award: Innovative E-Invoice Service Applications of the Ministry of Finance (project of Taiwan Province of China);
- Silver Award: Hajj Management Information System (province of Bangladesh);
- Silver Award: The Third-Generation Motor Vehicle and Driver Information System Project (project of Taiwan Province of China).

(c) Data Driven Value Creation:

- Gold Award: CTBC Data Analytics Transformation (project of Taiwan Province of China);

- Silver Award: House+ Automated Valuation System (project of Taiwan Province of China);
- Silver Award: ACH Fraud Management Project (Iranian ACH Fraud System) (project of Iran).

(d) Creating Inclusive Digital Opportunities:

- Gold Award: Eradication of digital divide and rural areas Service in Taiwan (project of Taiwan Province of China);
- Silver Award: National Intra-Network Project for Bangladesh Government (Info-Sarker) (province of Bangladesh);
- Silver Award: The Mobile P.O.S (Point of Sales) System (province of Korea).

(iv) Collaboration with ESCAP

19. Brief activity report of ESCAP to the 2017 AFACT Plenary meeting. The ESCAP representative gave a brief presentation on the following:

(a) Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific

20. This United Nations treaty, developed by ESCAP members, was opened to potential members on 1 October 2016. Bangladesh, Cambodia and China signed the Framework Agreement at the signing ceremony hosted by ESCAP in Bangkok on 29 August 2017. Several other countries are expected to sign in New York.

(b) Trade and Transport Facilitation Monitoring Mechanism (TTFMM)

21. A guidance on establishing a sustainable trade and transport facilitation monitoring mechanism was adopted as UN/CEFACT Recommendation No. 42. Project implementation in three countries including Bhutan, Bangladesh and Nepal was finalized.

(c) Capacity Building and Technical Assistance

- Agriculture Trade Facilitation;
- Trade Facilitation for Small and Medium-sized Enterprises (SMEs);
- Single Window and Paperless Trade;
- World Trade Organization (WTO) Trade Facilitation Agreement.

(d) Launch of e-learning course on Business Process Analysis (BPA) for Trade Facilitation

22. An online learning platform, based on the United Nations Network of Experts for Paperless Trade and Transport in Asia and the Pacific (UNNExT) BPA Guide—with testing and certification systems, is available free of charge to use.

(e) Research & Analysis on Trade Facilitation and Paperless Trade

- ESCAP-World Bank Trade Cost Database;
- Global Survey on Trade Facilitation and Paperless Trade Implementation 2017;
- Trade Process Analysis Database;
- Policy analysis (e.g. impact of paperless trade implementation on trade costs).

(f) Major Work Programmes and Events on Trade Facilitation in 2017

- Third meeting of the Interim Intergovernmental Steering Group on Cross-Border Paperless Trade Facilitation and Fourth meeting of its Legal and Technical Working Groups, 21-25 March 2017;
- Support for becoming parties to the Framework Agreement;
- WCO-UNESCAP 3rd UNNExT Masterclass: Digital Customs and Single Windows, Cheon-an, Republic of Korea, April 2017;
- 8th Asia Pacific Trade Facilitation Forum (APTFF), Yogyakarta, Indonesia, September 2017;
- Follow-up on Trade and Transport Facilitation Monitoring Mechanism (TTFMM);
- Updates of Trade Facilitation databases; Global Survey on Trade Facilitation and Paperless Trade in Asia and the Pacific 2017;
- UNDA 9th Tranche project on agricultural trade facilitation (2014-17);
- Capacity Building for Trade Facilitation (Republic of Korea);
- Capacity building towards cross-border paperless trade for trade facilitation in Mongolia and East and Northeast Asia and Central Asia;
- Promoting regional best practices in the application of Single Windows systems for trade facilitation in Eurasian Economic Union and North and Central Asia.

III. Conclusion

23. Thailand's Logistics Development Strategy (2017-2021) continues to enhance supply chain and trade facilitation in order to increase Thailand's competitiveness in terms of the Trading across Borders (Doing Business) ranking and the International Logistics Performance Index, lower Thailand's logistics cost relative to GDP and fully support electronic import/export services and transactions in 2021.

24. In the ASEAN region, Indonesia, Malaysia, Singapore, Thailand and Viet Nam are implementing the electronic filling of the ASEAN Trade in Goods Agreement (e-ATIGA Form D), also known as the certificate of origin, to bring the region closer to achieving the ASEAN Single Window (ASW).

25. There are currently 25 out of 29 WTO Members in Asia and the Pacific who have ratified The Trade Facilitation Agreement.

26. The region continues the implementation of paperless trade and electronic business to increase trade and transport facilitation and improve the cost-effectiveness of business. The collaboration between AFACT and ESCAP is expected to contribute to this.

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Paperless Trade White Paper

Paperless Trade White Paper

How Does It Impact the Trade System?

Developed in Collaboration with the World Economic Forum

Summary

In 2017, the World Economic Forum approached UN/CEFACT in order to create a guide on Paperless Trade which might help countries to understand and implement specific provisions of the World Trade Organization's Trade Facilitation Agreement, specifically article 10 on Formalities connected with importation and exportation (10.2, 10.3 and 10.4) as well as article 7 on Release and clearance of goods (7.1 and 7.2).

This White Paper provides a brief history on standardization of electronic business processes, especially within UN/CEFACT; the basics, benefits and challenges in electronic business processes; the governance of paperless trade; and future evolutions.

This document has been published by the World Economic Forum in October 2017 under the reference 261017, case 00036073.

This document is submitted to the twenty-fourth UN/CEFACT Plenary for noting.

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I. Introduction: What is Paperless Trading?

1. When goods and services cross borders in international trade, information needs to be passed between relevant parties, whether private companies or public bodies, including suppliers, logistics providers, customs, regulatory agencies, sellers and buyers. Paperless trade refers to the digitization of these information flows, including making available and enabling the exchange of trade-related data and documents electronically. Less formally, one can think of this as cross-border trade transactions using electronic data in lieu of paper-based documents.

2. Transforming what was traditionally a paper-based documentation system into an electronic format can speed up trade and ease the cost of doing business in today's interconnected world. Bottlenecks in supply chain management and regulatory documentation can be particularly tricky for smaller businesses or e-traders with less experience and resources. Paperless trading, therefore, serves as a promising means to deal with the logistical challenges of e-commerce and, in particular, small shipments across borders. Overall, it is quickly becoming an essential component of governmental efforts to improve the efficiency of customs controls and trade administration processes, and of ensuring trade competitiveness in a rapidly digitizing world.

3. How exactly is a trade transaction rendered paperless? Digitized exchange can be done in several ways. One way is simply to take a visual snapshot of a paper document – either a scanned or a PDF version. Another possibility is an internet web portal where individual data elements can be keyed in – this is known as data-trader interface (DTI). Paperless transactions can also be conducted using fully electronic messages – known as electronic data interchange (EDI), with formats including UN/EDIFACT, XML, JSON and other web services. Typically, these systems would provide an application-programming interface (API) to facilitate interaction with the database.

4. At first glance, the task of moving from paper-based to paperless administration of trade may seem relatively straightforward. However, because of the need to coordinate electronically across borders, the impetus for international cooperation rises once trade is rendered paperless. Governments use a variety of arrangements, including United Nations (UN) agencies and standards-setting organizations, as well as trade agreements, to establish the governance structures necessary for paperless trading. This white paper provides an overview of these efforts, which take place across a wide variety of disparate institutions, some of which lie outside the traditional institutions associated with trade governance.

5. The paper is written especially with trade policy-makers in mind to assist their considerations on how best to align trade rules with current and expected future trends in paperless trading. The paper is also intended to provide other stakeholders with a better understanding of existing efforts and possible future developments at the intersection of paperless trading and international trade administration to guide their inputs for trade policy.

6. Because of the wide variety of issues associated with paperless trading, it is important to establish boundaries in the scope of what is considered in this paper. Though scanned/PDF files can present benefits, this white paper concentrates primarily on transactions conducted through electronic messages. Electronic messages afford even greater opportunities for tapping into the benefits of paperless trading thanks to the potential reuse of data, the elimination of the need to re-key data into a computer at each supply chain checkpoint, and the reduction in potential human error. Note that aspects of this paper may apply to DTI and APIs as well.

7. The paper is also specifically focused on paperless trade as defined by the technical international trade community. This encompasses electronic forms of trade administration documents that are business-to-government (B2G) as well as business-to-business (B2B) electronic exchange of information within international trade context. The term "paperless trade", however, can be used by other communities in a broader sense to refer to the electronic exchange of data in a purely national commercial and regulatory context. For example, banks may refer to paperless trade as applied to trade finance processes – which may also have an international component. Further, different stakeholders may diverge on where the line may be drawn on what is considered paperless trade as applied to trade administration documents versus the broader digital commercial universe. The potential for different starting points on paperless trade should be kept in mind when engaging in dialogue on the topic.

8. The paper is a part of a series run by the World Economic Forum and the World Trade Organization (WTO) focused on e-commerce policy best practices. The inclusion of paperless trade in the series is from both the perspective of the digitalization of trade processes as well as the specific benefits this may have for small businesses using electronic platforms to engage in global trade.

II. How Does Paperless Trading Work?

9. While many may be familiar with the concept of paperless trading, the mechanics of how exactly paperless trading works is one that most individuals involved with trade, whether from business or government, will have given little thought. Like many other elements of our digital world, it is simply a technical development that is taken for granted. However, a basic overview of how it works in practice and the benefits may help inform debate on the need for cross-border cooperation on technical issues.

10. For parties to exchange and reuse fully electronic messages, all information needs to be clearly defined and unambiguous, both from a semantic and syntactical perspective. Trading partners wanting to exchange data will need to agree on the meaning of each individual data element to ensure that they all understand the information in the same way. This is equally true for governments and any other parties that may use or transmit this data. If the exchange is limited to two parties, a bilateral data dictionary is sufficient. As soon as there are multiple parties, however, or if the information may be reused in other contexts, a standardized data dictionary is useful.

11. When a commercial order is received, a system configured to use EDI messages can prepare all the necessary documents (or messages) to enable processing – such as packing list, delivery note, invoice and customs declaration. The system can also potentially manage reorders for stock replenishment and link to other entities to order transport, request certificates or arrange other services.

12. Code lists are another important part of moving from paper to electronic messages. Any information that can be codified should be codified to avoid confusion. For example, in English alone, packaging material that is palletized can be described as slab, board, honeycomb slate and so on, before even taking into account differences between languages. Humans might understand that each of these means palletized or stacked on pallet transport structures, but a computer, unless it has been programmed to recognize all the variations, will not necessarily understand that these are the synonymous terms. However, if "palletized" is indicated using a code, there is no ambiguity.

13. The technical challenges of facilitating paperless trade have been addressed by governments and supply chain actors in various forums and formats. UN agencies have played a key role in developing international standards for the electronic representation of

information required for trade documentation – helping to boost connectivity and interoperability. The United Nations Economic Commission for Europe (UNECE) founded the Working Party on Facilitation of International Trade (WP.4) as early as 1961 to "facilitate international trade and transport by promoting rationalization of trade procedures and the effective use for this purpose of electronic or other automatic data processing and transmission."[1]

Benefits for Traders

14. Over the past two decades, global trade has been increasingly defined by complex international production networks. Modern commerce is no longer an exchange between two parties but rather an extended collaboration between critical interdependent partners executed over vast geographic expanses, time zones and borders. The degree to which partners in a B2B context are proficient and make use of the network defines their success, hinged on the ability to process information using the internet and messaging protocols. The rise and spread of the internet, and with it the ability to send electronic files, radically transformed business information-sharing models – often allowing a number of authorized trading partners to stay updated simultaneously thereby keeping the entire network in sync. Paperless trade systems streamline the flow of information in global supply chains by simplifying the exchange of necessary documents or contractual elements – whether B2B or B2G – that accompany inputs crossing borders multiple times.

15. As such, paperless systems can generate savings for traders through faster movement of goods as well as greater efficiency at border agencies where the exchange involves trade administration documents. Data exchanged includes purchasing orders, inventory reports, and digital sanitary and phytosanitary (SPS) certificates, among others. Paperless trade can also help businesses meet regulatory compliance obligations more efficiently and at a lower cost – whether the concept is applied in a domestic or international context.

16. In some countries operating manual systems, official processes are also accompanied by steps added over time, resulting in systems littered with exceptions and complexity – for example, differing from point of entry to another. Dematerializing trade administration processes can help to create a system that is more difficult to modify informally.

17. Reductions in trade costs and efficiency via paperless trade can be particularly helpful for small and medium-sized enterprises (SMEs) using e-commerce platforms to access international markets.[2] E-traders may have more limited resources to manage additional trade documentation, or doing so for relatively low value parcels may be uneconomical. For example, one survey found that where EDI files were not accepted in some countries, each parcel needed to be declared individually (contents, dimensions and weight).[3] Delivery delays due to waiting times at the border can be damaging for e-traders relying on good customer reviews to build trust.[4]

18. As electronic messages typically move much faster than physical merchandise, implementing paperless trade systems has also driven major innovations in international

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1 Terms of Reference of the Facilitation of International Trade Procedures: http://www.unece.org/trade/facil/wp4_tor.htm (link as of 09/2017)

2 http://artnet.unescap.org/pub/WP146.pdf (link as of 09/2017)

3 https://www.wto.org/english/tratop_e/serv_e/wkshop_june13_e/ecom_national_board_e.pdf (link as of 09/2017)

4 https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Bringing%20SMEs%20onto%20the%20e-Commerce%20Highway_final_250516_Low-res.pdf

supply chains, such as "just-in-time" delivery. Using this approach, companies can hold as little stock as possible, ordering merchandise when it needs to be sold or used. Modern supply chains must equally adapt to ever-shortening production lifecycles, consumer tastes and rapid technological developments. Without electronic messages in the supply chain, these developments would be difficult.

19. Further, paperless trade systems have facilitated the emergence of "third-party logistics" (3PL) players that offer elements of distribution and fulfilment for clients. These play a vital role in the planning and execution of global trade. Some commercial solutions – such as customs APIs – offered by several logistics services providers can particularly help e-traders navigate customs clearance by enabling the integration of shipping and regulatory processes into their business systems and websites. Some logistics providers also offer landed cost calculators for e-traders to display the full cost of the product – including customs duties, shipping and transport – upfront to potential buyers and mitigate potential conflicts.[5] More broadly, the operational side of trade today hinges on the inclusion of third-party specialists covering freight forwarders, quality-assurance teams, customs brokers and transport carriers for ocean, air and road – many of which deploy dematerialized processes in a B2B context.

Benefits for Governments

20. By enabling real-time information on the location and status of a shipment, paperless trade can improve transparency and traceability. As supply chains become more complex, traceability has been sought by consumers, business and governments across all manner of products, to ensure labour, environmental and other standards. While traceability can be achieved through paper-based systems, digital systems are timelier and can reduce fraud. On the latter, paperless trade can help to tackle illegal and counterfeit trade or trade-based money-laundering by increasing the visibility on exported goods and easily exposing trades that make no commercial sense. Paperless trade can also help governments more efficiently to address growing security concerns and the need to ensure there are no potential threats hidden in commercial packages. Electronic data exchange, where two governments have agreed to do so, can enable a better tracking of the value of goods declared – in some manual systems, exporters might over-declare to maximize tax recovery, while an importer might under-declare to pay less import duties. Recent evolutions in technology, such as blockchain, could provide benefits in ensuring the integrity of data.

21. Paperless trade can also play a key role in cross-border regulatory cooperation. For example, standardized electronic data messaging language maintained by UN agencies can enable countries to exchange electronic SPS certificates for agriculture products or communicate laboratory results in the agri-food industry. The International Plan Protection Convention (IPPC) multilateral treaty under the UN Food and Agriculture Organization (FAO) is developing a globally harmonized approach for electronic phytosanitary certificates exchange – used to check the quality of food products – that will use UN e-business standards.[6] Another UN standard on electronic exchange of fishery data – including fishing locations, species and quantity caught and so on – could improve sustainable fisheries management and trade.[7]

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[5] https://www.clarity-ventures.com/ecommerce/-all-features/cutting-edge-logistics-integrations/customs-and-duties-integration (link as of 09/2017)

[6] As developed by the United Nations Centre for Trade Facilitation and e-Business (UN/CEFACT). See more here: https://www.ippc.int/en/ephyto/ (link as of 09/2017)

[7] UN/CEFACT's Fisheries Language Universal Exchange (FLUX) standard enables record and exchange of harmonized electronic data from fishing vessels to other parties. This could be one tool in help fisheries management traceability efforts in the supply chain in order to help reduce the incidence of illegal

22. Many countries are developing single windows that serve as one simple point of entry for submitting regulatory documents and other supporting evidence when merchandise is imported or exported. Almost all single windows implemented today are electronic systems with a web-based interface. As such, running an electronic single window usually requires the ability to process electronic message exchanges. The World Trade Organization (WTO) Trade Facilitation Agreement (Article 10.4) includes an endeavour to maintain or establish a single window using information technology to the extent possible and practicable. According to the United Nations Economic Commission for Europe (UNECE) Recommendation 33,[8] a single window is a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfil all import, export and transit-related regulatory requirements. If information is electronic, individual data elements should only be submitted once.

23. Implementing paperless trade and electronic single-window systems can contribute to improving a country's international commercial-enabling environment, encouraging more business activity, in turn driving economic growth and development. In Senegal, for instance, the implementation of the electronic single window reduced the border pre-clearance and clearance processing time by 90%, from an average of two weeks to just one day. The cost of border processes has decreased by 60%, while the streamlined system has allowed the border agencies to reassign staff to other priority areas.[9] In Costa Rica, the Inter-American Development Bank finds that the implementation of the electronic single window increased exports by 2% a year from 2007-2013. Looking at the cost-benefit analysis, an approximate $1.7 million invested in the system translated into a twentyfold gain in terms of increased exports and reductions in public administration costs.[10] This is equal to a rate of return of roughly $16 for every dollar paid. Peru also established a Single Window for Foreign Trade in 2010, which improves coordination by connecting eight government institutions that issue export and import permits, as well as shipping-related entities.[11]

III. Paperless Trade Challenges

24. Paperless trade is not without challenges. The set-up and operation of paperless trade measures, supporting regulation and electronic single windows, is not yet a given across all countries. The UN has conducted a survey of 120 countries, across a range of 38 measures related to trade facilitation and paperless trading. From a subset of factors relevant to all survey countries, it was then able to derive an average implementation score; a score of 100% reflects full implementation across all factors. The average implementation rate of trade facilitation and paperless trade measures from the most recent 2017 survey stands at

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fishing and trade. https://www.unece.org/info/media/news/trade/2017/unece-showcases-its-contribution-to-halt-overfishing-at-un-ocean-conference-in-new-york/doc.html (link as of 09/2017)

[8] The first international description and recommendation on Single Window, "Recommendation and Guidelines on establishing a Single Window to enhance the efficient exchange of information between trade and government Recommendation 33" UNECE 2005, see page 3, point 2: http://www.unece.org/fileadmin/DAM/cefact/recommendations/rec33/rec33_trd352e.pdf (link as of 09/2017)

[9] African Alliance for E-Commerce and World Bank. AACE Single Window Peer Review: Senegal. 2014.

[10] Volpe Martincus, Christian. *Out of the border labyrinth: an assessment of trade facilitation initiatives in Latin America and the Caribbean*. Inter-American Development Bank. 2016. P. 200

[11] http://www.intracen.org/publication/SME-Competitiveness Outlook-Meeting-the-Standard-for-Trade/ (link as of 09/2017)

61%.[12] This figure reflects steady improvement over the past two years but also highlights the degree to which most countries have yet to implement the full range of possible measures.[13]

25. Even more alarming is the fact that only about 34% of countries have implemented measures related to the cross-border exchange of electronic data and documents.[14] Results from the OECD-WTO Sixth Global Aid for Trade Review show that while most IT border systems in developed and emerging economies can be used for EDI-based exchange, this is still under implementation in many low-income economies. Countries with less clear legislation, weaker infrastructure and lower IT capacity can face hurdles in implementing paperless systems.

26. Furthermore, only about 40% of all upper-middle income countries have single windows in place, while the figure is 20% for lower-middle income countries and less than 10% in low-income countries.[15] The OECD finds that progress on implementing single windows is often linked to the quality of cooperation and information exchange among various government agencies, customs departments and border control posts.[16] Single-window implementation may pose a bigger challenge for countries more reliant on imports due to complexity. Some systems may also not satisfy the five-point definition of a "single window" – whether because there is not a governmental mandate resulting in multiple systems or there is not a clear single entry point. Where single windows do not distribute information to all relevant regulatory bodies, traders may still need to submit information several times.

27. Paperless trading is also reliant on domestic rules on the legal validity of electronic documents, electronic signatures, where these are applied, and other data-regulation requirements. Further, if paperless trade is to be effective in the international trade-enabling context, governments must accept data at customs and within regulatory agencies without also requiring original paper documentation. In other words, a paperless system that still requires the submission of paper-based documents at some point in the trading chain destroys much of the value of the digital tools for traders.

28. Finally, capacity building may be needed to boost paperless trade use. SMEs and e-traders may lack access to the internet, encounter slow connections, or pay high usage rates. Even with access, they may not have the digital skills to use new IT systems or services or be able to maximize the advantage of going paperless.[17]

IV. Technical Standards for Paperless Trading: A brief history

29. As is true of any system with complex technical arrangements that require cross-border cooperation, international standards have emerged for different facets of paperless trade. This section provides a quick overview of these standards, including their historical evolution.

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[12] http://www.unescap.org/news/good-progress-made-implementing-wto-trade-facilitation-agreement-still-long-road-paperless-and (link as of 09/2017)

[13] Note that the average implementation rate in 2015 was 53%. See https://unnext.unescap.org/content/global-survey-trade-facilitation-and-paperless-trade-implementation-2015 (link as of 09/2017).

[14] See supra note 11.

[15] https://www.wto.org/english/res_e/booksp_e/aid4trade17_e.pdf

[16] Ibid.

[17] http://www.intracen.org/publication/Bringing-SMEs-onto-the-e-Commerce-Highway/ (link as of 09/2017)

Box 1: The United Nations Centre for Trade Facilitation and e-Business

Box 1: The United Nations Centre for Trade Facilitation and e-Business

The United Nations Centre for Trade Facilitation and e-Business (UN/CEFACT) is an intergovernmental body of the UNECE. It develops policy recommendations and standards based on public and private sector collaboration. Work on these deliverables requires the support of at least three UN Members. Completed projects are presented to the UN/CEFACT Plenary – which any UN Member can join – for approval. In this way, all countries can participate in the standardization process. All results are available free of charge.

UN/CEFACT aims to be a semantic hub for data elements. It maintains a Core Component Library (CCL) that serves as an encyclopedia of data elements and includes inputs from other organizations with electronic business standards; this is outlined in a multilateral MoU between UNECE and the International Standards Organization (ISO), International Telecommunications Union (ITU) and International Electrotechnical Commission (IEC). A long-term objective is to harmonize various data elements and render the base semantics compatible between different standards bodies. Other bodies such as the World Customs Organization (WCO) have aligned their data requirements with past CCL libraries as demonstrated in a case study in Annex B.

30. International technical standards play an important role in trade governance, in large part due to the WTO Agreement on Technical Barriers in Trade (TBT Agreement) and similar language in free trade agreements (FTAs)/regional trade agreements (RTAs). WTO Members are required to base their technical regulations for trade in goods on international standards or to explain why deviation is necessary. Awareness of the existing international standards, and the institutions through which these standards are established, is important for trade policy-making. This is especially the case if paperless trading systems at the border will be integrated with domestic regulatory systems concerning the distribution and sale of goods behind the border.

31. Disparate institutions at the multilateral and regional levels are involved in the creation of these international technical standards. Because of the division of responsibilities within government bureaucracies, some trade policy-makers will not necessarily be aware of the work of other officials within their own government in establishing these technical standards, despite the fact that the creation of such standards will inevitably impact traders. The discussion below is also intended to flag for trade policy-makers the various forums through which international technical standards governing paperless trading are being shaped, so that they can better coordinate their policy-making objectives on paperless trade within their government.

32. Efforts to improve cross-border exchange of trade information date back more than 50 years. The UN Layout Key was developed in the 1960s to standardize the representation of information on trade documents. It was quickly accompanied by a data dictionary so all parties would consistently understand the same thing. The birth of the UN Trade Data Element Directory, or UN/TDED, was the first essential step towards electronic messages.

33. As mentioned above, code lists are another important feature of paperless trade, allowing for better mutual understanding of content as textual information may be incomplete, misleading or uninterpretable. UN/CEFACT maintains a number of code lists that can be downloaded free of charge and are often used by other standard-setting bodies to increase interoperability. Further information on UN/CEFACT code lists is included in Annex A.

34. The availability of a data dictionary and the use of code lists combined with an exponential growth in the use of computers led to the creation of standardized messages for data exchange. The UN Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT) was one pioneer in this area – effectively replacing some paper documents from the mid-1980s onwards. Similar initiatives took place regionally.

35. UN/EDIFACT is a syntax or message exchange language that is centrally maintained by UN/CEFACT. Some messages are developed by other organizations and then submitted to UN/CEFACT to be harmonized and entered into the official directories. The messages are identified by a six-character name, such as INVOIC for invoice or CUSDEC for a customs declaration, and the information is organized into groupings, similar to those found on paper documents including importer information, product details, payment conditions, and so on. Each grouping has a strict format – such as length and type of information – much of which was inherited from paper documents. Further information on the technical functioning of UN/EDIFACT messages is detailed in Annex A.

36. UN/EDIFACT was the dominant messaging syntax throughout the 1990s and remains likely the most widely used single standard for data exchange – especially since it is freely available and is regularly updated. While official statistics are hard to come by, sectoral estimates, such as those by the maritime industry, indicate that about 8,000 EDIFACT messages are exchanged per day.

37. Even so, over the past two decades an increasing number of exchanges use XML. This EDI syntax provides higher flexibility in the structure, length and format, often making it more attractive. However, there is no single, centrally maintained XML version – there could potentially be as many XML languages as business partners. Other technical disadvantages include larger data files. UN/CEFACT does offer a standardized XML, as do some International Organization of Standards (ISO) committees, the World Customs Organization (WCO), the International Air Transport Association (IATA) and others. The UN/CEFACT approach to XML has been to start standardizing the processes and then the data related to each process is to contain before creating XML messages. Further information on XML languages is contained in Annex A.

38. The use of electronic invoices merits particular attention. The European Union has decided that all public institutions must accept and may require electronic invoices, as part of a wider drive to decrease the use of paper. Two standards should be used to ensure interoperability, one of which is the UN/CEFACT Cross Industry Invoice (CII). All public institutions – from elementary schools to garbage collection, from town halls to ministries – will be obliged to accept the CII as one of the official standards for the submission of electronic invoices.[18] Other countries are also seriously studying implementation of the CII.

39. The CII is accompanied by a series of messages, beginning with the term cross-industry, which aim to cover a range of domain needs from agriculture to automotive and industrial services. Cross-industry messages cover invoice, ordering, catalogue, quotation, delivery, remittance and so on. These have today been consolidated into a Supply Chain Reference Data Model that enables a process-driven approach instead of a document-driven approach to supply chain information exchanges.

V. Key Principles for Paperless Trading

40. From all of the above, it is hardly surprising that paperless trade is often seen as a tech-driven process. But this is only partially true: implementation requires, first and

[18] See case study in Annex B

foremost, a high-level political consensus, policy frameworks, supporting laws and legislation and an institutional set-up. A policy framework may define targets and implementing strategies and detail the necessary allocation of resources, while enabling legal structures includes laws and statutes, implementing decrees and regulations and contractual provisions – such as for the terms of use or the provision of electronic single windows or e-Port Community Systems.

41. Efforts towards uniform supporting legislation came a decade after the initiation of technical standards for paperless trade, largely through the United Nations Commission for International Trade Law (UNCITRAL), which developed model laws relevant to electronic transactions, e-commerce and e-signatures.[19] These model laws include several key governance principles.

42. The first is the principle of non-discrimination between the use of electronic communications and paper when submitting documents such as those required by regulatory agencies. Laws that allow the submission of electronic information are essential for launching an effective paperless trade system.

43. Second, the principle of functional equivalence implies that paper-based functions may be replicated by electronic communications or procedures, which may or may not be mirror images of paper-based procedures but fulfil the same legal functions.

44. Third, applying the principle of technological neutrality implies ensuring that legislation does not favour specific technologies. In a rapidly changing digital and technology environment, paperless trade policy frameworks must be open to future developments. Detailed provisions on technical requirements can be contained in implementing regulations that are easier to adapt as needed.

45. These principles have been carried forward in some trade and regional integration contexts. Part of the legal framework for electronic contracting is also based on standard contracts and rules such as the Incoterms and the Uniform Customs and Practice for Documentary Credits of the International Chamber of Commerce.[20] Paperless trade policy frameworks can also relate to issues on data authentication and security as well as data protection and retention, including data archiving and sharing.

VI. Global Governance of Paperless Trade

46. At present, a number of efforts exist to advance interoperable paperless trade policy frameworks through a variety of approaches. These include recommendations from UN agencies, trade deals and regional integration initiatives. Importantly, these ongoing efforts exist across institutions and are not necessarily coordinated.

47. One approach has been to focus on shaping non-obligatory norms, or suggested recommendations, for governments to follow. UN/CEFACT plays a key role in developing trade facilitation recommendations targeting high-level policy-makers that typically touch on specific aspects of paperless trade. For example, Recommendation 12 applies to facilitating maritime transport documentation through a principle of an electronic sea waybill to replace the paper-based bill of lading. Recommendation 14 provides guidance on electronic authentication for trade documents.

[19] For further information on electronic transactions and e-signatures, see "Making Deals in Cyberspace: What's the Problem," World Economic Forum, October 2017.

[20] UN/CEFACT provides a code list for Incoterms in Recommendation No. 5.

48. Another approach has been to develop treaty provisions. The WTO TFA, a multilateral deal that entered into force in February 2017, contains a number of provisions potentially relevant to paperless trade. These refer to the electronic exchange of data and documents, the electronic submission of trade related documents, e-payment systems, electronic single window systems and international standards for paperless trade. Some specific references are detailed in Table 1 (below), although others could also be considered.

49. While covering aspects related to paperless trade, the textual language of the TFA leaves much room for WTO Members to shape their own systems and legal frameworks. The TFA is also crafted to take into account individual country situations and capacities. To benefit from the special and differential treatment provisions found in the agreement, WTO Members must categorize and notify their ability to fulfil each provision and may signal the need for support for implementation. Estimates suggest that full implementation of the TFA – which includes but goes beyond paperless trade administration provisions – could reduce trade costs by an average of 14.3% and boost global trade by up to $1 trillion a year.[21]

Table 1: WTO TFA provisions relevant to paperless trade

Article	Provision
Article 7.1	"Each Member shall, as appropriate, provide for advance lodging of documents in electronic format for pre-arrival processing of such documents."
Article 7.2	"Each Member shall, to the extent practicable, adopt or maintain procedures allowing the option of electronic payment for duties, taxes, fees, and charges collected by customs incurred upon importation and exportation."
Article 10.2	"Each Member shall, where appropriate, endeavour to accept paper or electronic copies of supporting documents required for import, export, or transit."
Article 10.3	Encourages Members to "use relevant international standards or parts thereof as a basis for their import, export, or transit formalities and procedures" which in theory would apply to standards relevant for e-commerce as well.
Article 10.4	"Members shall endeavor to establish or maintain a single window, enabling traders to submit documentation and/or data requirements for importation, exportation, or transit of goods through a single entry point to the participating authorities or agencies." The article further stipulates that "Members shall, to the extent possible and practicable, use information technology to support the single window."

50. Besides these texts, paperless trade provisions commonly feature in FTAs. Indeed, the first e-commerce provision found in any trade deal addresses paperless trade, specifying that parties should have in place an electronic environment supporting electronic business application between their customs administrations and trading community.[22] One study found that more than half of the trade agreements in play since

[21] https://www.wto.org/english/res_e/booksp_e/world_trade_report15_e.pdf (link as of 09/2017)

[22] 2001 RTA between New Zealand and Singapore, as referenced in https://www.wto.org/english/res_e/reser_e/ersd201711_e.pdf (link as of 09/2017)

2005 address paperless trade in some shape or form.[23] Specifically, in a recent study of regional trade agreements, the WTO notes that paperless trade administration provisions are found in the e-commerce chapter of 47 RTAs (or 32 RTAs if provisions referring to e-government are excluded) and in the customs procedures or trade facilitation chapters of 39 RTAs. In addition, related provisions on electronic procurement can be found in the government procurement chapter of 25 RTAs. Overall, paperless trade provisions are the sixth most common type found in RTA e-commerce chapters.[24]

51. The focus area and coverage of these provisions, however, can vary greatly. Specific articles on paperless trading often take the form of soft, rather than hard binding commitments where negotiators use language such as "shall endeavour". The provision is usually accompanied by a definition of trade administration documents.[25] Paperless trading provisions frequently require that a government make publicly available electronic versions of all trade administration documents – sometimes specifying a time-delineated implementation goal. These also typically require the government to accept trade administration documents submitted electronically as the legal equivalent of the paper version of such document.

52. Select FTAs require parties to work towards the implementation of initiatives that support paperless trading – such as electronic single windows. An FTA between Chile and Australia, for example, refers to the development of a single window with cross-referencing between the e-commerce and customs chapters. Several FTAs see parties pledge to use international standards or methods when developing paperless trade systems, which can be a good way to ensure interoperability.

53. Some countries have inserted provisions on cooperation in relation to paperless trading. This can take the form of sharing experiences on regulations, laws and programmes on e-commerce and e-government – with the latter a proxy for paperless trading – or regulatory dialogue. A limited number of agreements require parties to cooperate bilaterally and in international forums to enhance the acceptance of electronic versions of trade administration documents. The Japan-Singapore FTA commits parties to encourage cooperation between relevant private entities engaged in paperless trading and establishes a joint committee on paperless trade geared towards reviewing implementation issues.

54. The minority of FTAs in which the language of the standalone "paperless trading" provision is drafted as a binding obligation almost all concern an FTA with Australia or New Zealand. These include the Australia-China FTA, Australia-Malaysia FTA, Australia-Singapore FTA, Australia-Thailand FTA and New Zealand-Thailand FTA. Each of these agreements allows limited exceptions if there is a "domestic or international legal requirement to the contrary" or if paperless trading would "reduce the effectiveness of the trade administration process".

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[23] Duval, Yann and Kong Mengjing. Digital Trade Facilitation: Paperless Trade in Regional Trade Agreements. ADBI Working Paper Series, June 2017. Available at https://www.adb.org/sites/default/files/publication/321851/adbi-wp747.pdf (link as of 09/2017) Note that this study uses a broader definition of paperless trading than the WTO study referenced below.

[24] https://www.wto.org/english/res_e/reser_e/ersd201711_e.pdf (link as of 09/2017)

[25] WTO research notes that this typically refers to forms issued or controlled by the government of a party, which must be completed by or for an importer or exporter in relation to the import of export of goods. The FTA between Japan and Switzerland is the only agreement notified to the WTO that extends the definition to forms that a party issues or controls that must be completed by a services supplier. For more, see: https://www.wto.org/english/res_e/reser_e/ersd201711_e.pdf (link as of 09/2017)

55. Among recent FTAs, the Trans-Pacific Partnership (TPP) had the broadest comprehensive coverage in terms of elements related to paperless trading. It included acceptance of electronic copies; e-submission of trade-related documents such as SPS certification; electronic customs systems; e-certification and e-signature, including mutual recognition; and international standards. Besides the TPP, other FTAs with a broad scope of coverage include the US-Republic of Korea FTA and several other recent Korean FTAs (such as those with China and Viet Nam).

56. In general, the breadth of paperless trading elements is broadest for FTAs negotiated in the Asia-Pacific, reflecting the region's leadership in this area. While the EU has focused on building paperless trading systems for its members, FTAs negotiated by the European Commission tend not to put as much emphasis on paperless trading as compared to those negotiated by the US, Australia, Republic of Korea, or others. The EU agreement with Colombia and Peru includes the commitment to endeavour to make trade management documents available electronically and to accept electronic documents as the legal equivalent of paper. The agreement with Korea includes cooperation on implementing paperless trading.

57. The UN Economic and Social Commission for the Asia-Pacific (UNESCAP) adopted a Framework Agreement on Facilitation of Cross-Border Paperless Trade in May 2016 to advance regional coherence. The treaty is designed to provide new tools and a digital complement for implementing the TFA and facilitating cross-border commerce. Among other things, it will help to promote general principles to enable the exchange and mutual recognition of trade-related data and documents in electronic form. Some estimates suggest full implementation could boost Asia-Pacific exports by as much as $257 billion annually, while the time taken to export could fall by 44%. Cost savings across all trade in the Asia-Pacific region could be worth $7 billion annually.[26] The UNESCAP Framework Agreement includes specific provisions to consider requests from least developed and landlocked developing countries for technical assistance to develop paperless trade capacities.

VII. Technical Considerations Looking Ahead

58. On the one hand, the constant evolution of technology requires avoiding regulation that locks in one particular solution. On the other hand, the introduction of new technologies or standards into trade processes will create disruptions for actors in the supply chain, so transition plans will be essential.

59. To date, it is worth noting that electronic messages have been treated as a direct alternative to paper documents, with paperless trade effectively taking a "document-driven" approach with the information in electronic messages being organized in line with corresponding documents, such as invoice, bill of lading, customs declaration and so on. However, this does not optimize the information being gathered. Most documents are part of a chain of information exchanges and a good deal of information tends to be repeated at each step whether on the paper document or an electronic equivalent.

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[26] "New UN treaty to facilitate paperless trade in Asia and the Pacific to support Trade Facilitation Agreement implementation." Trade Facilitation Agreement Facility, 1 October 2016. Available at http://www.tfafacility.org/new-un-treaty-facilitate-paperless-trade-asia-and-pacific-support-trade-facilitation-agreement (link as of 09/2017)

60. A process-driven approach to the chain of information exchanges would instead consider each exchange within the context of other exchanges related to the same process. Each electronic message in the chain only needs to contain new information, rather than repeating redundant information. The approach implies rethinking how information is exchanged. It also corresponds more closely to the one-time data entry called for in single windows, as defined in UNECE Recommendation 33, and is closer to concepts behind blockchain technology. UN/CEFACT has produced Reference Data Models that support this approach.

61. Finally, as has been made clear by now, technical standards are a key part of paperless trade. However, it is important to keep in mind the individual agendas of organizations that push their standards, or that disparage another standard. Many IT companies will make a living off complicated data exchange so it may not be in their interest to have an interoperable system. This is sometimes the case for certain governments or government administrations as well. Nevertheless, as more and more trade and international business processes move online, ensuring interoperability and interconnectivity between systems would help to maximize the benefits of the digital economy. This is as much a strategic regulatory choice as it is a business case.

VIII. Options for Further Trade Governance

62. Several WTO Members have raised the possibility of discussing paperless trade at the WTO, in some instances in connection with implementing the TFA. This includes suggestions for WTO members to accept electronic trade administration documents and grant these the same legal status as paper versions; and facilitating access to, use of and data exchange with the single window of a member's authorities for international trade by cross-border e-commerce transaction platforms and traders.

63. One question raised by the examination above is whether WTO members would be willing to accept any treaty language that takes the form of binding, rather than soft, commitments. To date, most RTAs have not used such language – with a few exceptions in the Asia-Pacific region – except on cooperation and information exchange provisions. What type of principles or cooperative approach could the WTO take? What could be learned from the TFA in terms of graduated levels of commitment and binding?

64. Certainly, activity is happening outside the WTO, as evidenced by UNECE's 50-year commitment on the topic. As well as growing prevalence in FTAs, regional initiatives to promote interoperable paperless trading systems are also proceeding, including the UNESCAP paperless trade governance framework. As another example, the Asian Pacific Economic Cooperation (APEC) economies' 1998 Blueprint for Action on Electronic Commerce included a pledge on reducing the requirement for paper documents for customs or other cross-border trade administration by 2005 for developed economies and by 2010 for developing economies, or as soon as possible thereafter. APEC ministers have recognized the potential of paperless trading on several occasions since and have voluntarily outlined individual action plans on paperless trading from 2002 onward.[27]

65. Some countries are also exploring innovative bilateral projects to address new trends. For example, Australia and New Zealand are putting in place an e-commerce "green lane" trial to allow for more seamless movement of low-risk goods through the

[27] https://www.apec.org/Meeting-Papers/Leaders-Declarations/1998/1998_aelm/apec_blueprint_for.aspx (link as of 09/2017)

international mail stream between the two countries. The move is driven by recognition of the increasing volume of low-value e-commerce items in the mail stream. The aim is to pre-screen and pre-clear e-commerce goods using data, enabling faster border clearance, improving efficiency of processes, and directing organizational resources towards high-risk goods. The trial is consistent with a WCO-UPU global model for data exchange between customs and posts, agreed in 2012. The trial will use the WCO-UPU Data Model message formats to support the implementation of Electronic Advance Data (EAD) between post and customs, enabled by the UPU CDS.POST IT platform. To ensure the quality of data, e-traders will be encouraged to provide item-level data electronically.

66. In light of the above, trade officials, customs authorities, regulators and non-governmental stakeholders wishing to advance paperless trade could consider the following questions to establish intervention points:

- To what extent do your regulatory authorities and other officials already accept electronic submissions of trade-related documents? Is this possible, for example, for certificates of origin, SPS certificates, etc., or only for standard trade documentation?
- Do you treat electronic versions of trade documentation as equivalent to the paper version? If not, why not? What are the areas where paper documentation is still required?
- To what extent does your government already permit electronic payment of duties, taxes and other charges associated with import or export?
- Are your systems aligned with international standards? Which standards? Where are they not aligned? What is the rationale given for why not?
- If paperless systems do not exist currently, what are the limitations preventing their implementation? Are there any near-term plans to build out more paperless trading systems?
- How costly will it be to move towards electronic systems for trade documentation? What types of cost savings might you recoup over time? Is it likely that you will be able to procure the funds to do so?
- Besides cost, what political roadblocks might be encountered in transitioning away from paper for trade documentation and records?
- Are there regional initiatives already under way or ones that could develop in the near future?
- Which business constituencies will be most affected by the switch to paperless systems?
- What types of capacity building programmes will be required to maximize the benefits of paperless trading for SMEs? Is the government equipped to provide this capacity building, or is there another actor that can do so?

67. Capacity building programmes are a key element to ensure that the benefits of paperless trade are widely available and taken advantage of. Thailand's Electronic Transactions Development Agency (ETDA) and Office for SME Promotion (OSMEP), for example, have developed a training programme for SMEs to use the national and ASEAN Single Window. An ASEAN Connectivity through Trade and Investment (ACTI) project also hosts working group meetings to boost SME knowledge on the ASW and cargo clearance challenges and expectations. The Republic of Korea's uTradeHub helps to facilitate a full range of international trade processes from certification and licensing, to customs, logistics and cross-border transaction. SMEs can use the system to conduct

negotiations with potential buyers and sellers, address logistics, customs procedures and e-payments.[28]

68. Experts also recommend using workshops and consultations with SMEs to discuss the digitalization of trade processes – including taking stock of what trade information is already processed electronically; what blockages exist to SMEs participating in the electronic exchange of documents; and what human resource capacity building and/or other facilities would be needed to enable SMEs to benefit from electronic procedures, such as mobile applications.[29]

69. An outstanding question across the policy, technical and business community lies in the application and spread of new advanced technologies. Are businesses in developing countries equipped with the infrastructure and enabling environment to stay connected to international production networks? Will these technologies add costs or make processes easier and cheaper? If applied in a B2G context, how to ensure interoperability and capacity building? International production networks dependent on advances in technology have helped to drive global growth over the past several decades. A world with increased connectivity, digitization and smart technology could accelerate this still further, providing the right frameworks are in place.

[28] http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/makingwto.pdf (link as of 09/2017)

[29] http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/makingwto.pdf (link as of 09/2017)

ANNEX A

Selection of UN/CEFACT Technical Standards

1. UN/EDIFACT messages cover all aspects of the international supply chain. For example, in the transport sector, UN/EDIFACT covers both contractual messages such as forwarding and consolidation (IFCSUM), booking (IFTMBF), consignment advice (IFTMCA), multimodal status report (IFTSTA), and operational messages such as bay plan/stowage plan (BAPLIE), vessel call (CALINF), and container gate-in/gate-out (CODECO). These messages allow traders to book transport, receive updates on the status of their delivery, declare where containers are on a ship, declare when a ship is to call at a port, communicate when a container arrives or leaves a customs-controlled area, just to give some examples.

2. Customs messages in UN/EDIFACT are well known around the world by their six-digit abbreviations CUSCAR (cargo reports), CUSDEC (customs declarations), CUSREP (customs response), PAXLST (passenger list) and, more recently, GOVCBR (government cross-border regulatory message). These messages are developed by the World Customs Organization but standardized and maintained by UN/CEFACT.

3. The supply chain sector also widely uses UN/EDIFACT messages for information such as purchase orders (ORDERS), despatch advices (DESADV), sales forecasts (SLSFCT), and inventory reports (INVRPT). Financial services use a good number of UN/EDIFACT messages such as invoice (INVOIC), remittance advice (REMADV), and quotations (QUOTES). There are also UN/EDIFACT messages in accounting and audit, architecture and construction (in particular for project management), health and insurance, statistics, social security, employment, education and travel/tourism. Being standardized internationally, these all can be used at both cross-border level and national level.

4. XML is a longer form of data message and so requires more storage space as well as bandwidth for transmission. The segments in XML can have human readable names (known as "tags") instead of being limited to three characters and the format of the data is less rigid since it is largely disassociated from the paper format. The UN/CEFACT approach to XML focuses on the semantics (data definitions and content) instead of just the outline of the messages themselves. Each UN/CEFACT XML deliverable includes: a Business Requirement Specification (BRS) describing the choreography of events within a process; a Requirements Specification Mapping (RSM) defining the data requirements and all relevant entries in the UN/CEFACT Core Component Library (an encyclopaedia of all data elements); and a resulting XML message (or a series of XML messages, as the case may be).

5. UN/CEFACT also has three main types of code lists. The first are recommendation code lists which are published as trade-facilitation recommendations (typically the main recommendation describes the code list and its use, and the actual code list is in an annex to facilitate its updating). These cover codes such as packaging, units of measurement, modes of transport and identification of ships, among others. UN/LOCODE is also a recommendation code list and aims to identify all locations linked to international trade; it is essential for the clear identification of locations in the maritime and other transport industries as well as customs. The second are code lists that are maintained within UN/EDIFACT; there are many more of these including, among others, types of documents, types of contracts, types of dates, party function and business function. These two types of code lists are essential in electronic messaging.

6. The final type is jointly published. These are often recommendation code lists, such as country and currency (jointly published by UN/CEFACT and ISO) and INCOTERMS

(jointly published by UN/CEFACT and the International Chamber of Commerce). In all three cases, UN/CEFACT sees its work on codes as important in order to allow the free use of essential lists, as UN/CEFACT publishes all of its code lists free of charge, which is not the case for many other organizations.

ANNEX B

Case Studies of Paperless Trade Implementation

e-SPS: Netherlands and China.

1. International trade in agricultural products is an important economic activity. Many agri-food products require sanitary or phytosanitary (SPS) government certificates to clear customs. These SPS certificates serve as an official communication from the competent authority of the exporting country to the competent authority of the importing country that the cargo meets minimum sanitary requirements. Paper certificates can be costly, are logistically complicated and difficult to protect against fraud. Electronic certificates are also much more accurate than paper certificates. Electronic certificates will lower the number of interceptions and reduce time in ports. Countries are increasingly shifting to electronic customs and port clearance systems to enable better risk management. As a result, relevant regulatory bodies – including IPPC, OIE and CODEX – have recognized electronic certification as an alternative to paper certificates.

2. The Netherlands and China launched a five-year project in 2010 to pilot the practical implementation of electronic SPS certificates. The project used a step-wise, confidence-building approach, with the two parties initially exchanging information on standards and technology, then subsequently using certificates both in electronic and paper form, and finally moving to a fully digitized system.

3. The project used a UN/CEFACT standard XML message developed for electronic SPS certificates. Questions arose, however, around ensuring the authenticity of the document. Paper certificates are in most cases produced on security paper and signed and stamped to provide a proof of integrity and authentication. As a result, each electronic message containing the SPS certificate was accompanied by an electronic signature using the XMLDSig standard of the W3C. The management of the electronic signature was based on the FIPS 140-2 (National Institute of Standards and Technology of the USA) standard terms of technology and procedures. The shift also required legal frameworks that recognized the electronic signature.

Paperless Air Cargo (IATA Cargo-XML): Jamaica

4. The International Air Transport Association (IATA) has developed the Cargo-XML Messaging standards using the UN/CEFACT core component library. These Cargo-XML messaging standards are used by the airlines for end-to-end cargo business, fulfil customs' advance cargo information (ACI) and filing requirements and provide compliance with regulators' security requirements. The use of core components from the UN/CEFACT data library (CCL) makes the IATA Cargo-XML standards multi-modal and compatible for cross-border movements allowing interoperability between various systems and stakeholders. For example, the IATA Cargo-XML standard is compatible with the WCO Data Model, since both are based on UN/CEFACT core components.

5. The United Nations Conference on Trade and Development (UNCTAD) has fully integrated IATA Cargo-XML standards into its automated customs management system ASYCUDA World that is used by about 90 countries for their customs procedures. The new data standard improves data quality and simplifies communications across the supply chain facilitating trade growth, helping with cargo security, modernizing customs operations and fostering participation in global commerce through advance electronic data submission for air cargo shipments. It also facilitates customs risk assessments for air cargo shipments and improves compliance with security regulations.

6. Jamaica was the first country to implement IATA Cargo-XML standards using the UNCTAD ASYCUDA World system for its advance cargo information filing. Carriers flying into Jamaica are required to provide advance information for air waybill, house waybill and flight manifest to Jamaica customs prior to flight arrival using respective IATA Cargo-XML standards. The project is helping to set a foundation for paperless trade; modernizing customs operations; driving better trade efficiency and competitiveness; enhancing security; boosting compliance by carriers with regulatory requirements; and reducing paper waste. Together, these benefits help to lower trade costs, with savings passed on to business and consumers.

7. The rollout of the IATA Cargo-XML standards in Jamaica was based on several key steps. This included strategic alignment between Jamaican customs, UNCTAD and IATA through regular dialogue to develop a business and IT strategy. The dialogue resulted in the recognition of the WCO SAFE Framework (standards to secure and facilitate global trade) and IATA standard messages, legislative amendments and a roadmap for implementation. There was also a need for resource and implementation planning. Customs and IATA agreed on the implementation approach, as well as filing schedule, amendment and cancellation rules. Customs obtained the necessary documentation (e.g. IATA Cargo-XML Toolkit) and related IATA support. The overall solution initially ran as a pilot. IATA engaged relevant stakeholders to start filing data. UNCTAD and Jamaican customs fine-tuned the solution in accordance with the pilot findings. Jamaican customs, UNCTAD and IATA also developed user guidance and industry communication material such as the filing standards, timelines, responsible parties and compliance conditions, including final enforcement date. IATA is now pursuing a similar approach with other countries for ACI implementation.

e-Invoicing for Public Administration: Italy

8. Starting in June 2014, e-invoicing became mandatory in Italy for public administration bodies, including ministries, tax agencies and national social security – an obligation extended in 2015 to all other government bodies. The Italian banking system consequently developed a model that enables the transmission and issuing of e-invoices. Currently, e-invoice standards in use are proprietary, as defined by the Italian government by specific tags. In the near future, however, the government will be obliged to also support international standards, among which is the UN/CEFACT cross-industry invoice format that has been included in the official EU directive list.

Data Pipelines and Reference Data Models: EU

9. Some EU projects have been working on the concept of "data pipelines", led by UK and Dutch customs. A data pipeline aims to capture data at its source and manage information along the supply chain, with each actor adding just the information pertinent to their operations.

10. Several UK IT software providers have adopted this approach to offer added services to their clients. The pipeline, which was originally meant to provide more accuracy in the data sent to government authorities, is also being used to improve supply-chain transparency. Large retail companies execute hundreds of orders and receive many goods containers daily. Until now, opening a container was much like opening a present – uncertain of what would be inside. The pipeline approach allows several larger retailers to directly link the goods ordered to the container and have better visibility of when it will arrive. The data captured at source also allows importers to verify shipments before they actually leave the supplier, helping to avoid errors in supply and packing.

11. Shipping lines also benefit from the data-pipeline approach. Information can be lost between the steps of traditional paper-driven processes. This may affect the bay plan, such as temperature requirements or actual weights. Putting a heavy container on the upper

decks of a ship may cause it to capsize and putting goods that require special attention because of temperature on lower decks may cause these to catch fire and cause disasters. The pipeline approach has already enabled several cases to be identified and avoided.

12. Data pipelines are largely process-driven. UN/CEFACT has developed a pipeline standard based on the experience of these EU projects. In parallel, the UN/CEFACT Core Component Library (CCL) – an encyclopaedia of all data required for international transactions – has been organized into Reference Data Models that provide only information relevant to a specific area of activity such as logistics or supply chains. As the entire CCL contains information pertinent to all cross-border activity, such as logistics, finance, agriculture, tourism and so on, finding information for a single domain can be difficult with the added information from others. These Reference Data Models, combined with the pipeline approach, enable an event-driven process, communicating snippets of information instead of entire documents. An event-driven process is essential for full Single Window implementation or the eventual application of blockchain technologies to paperless trade.

UN/LOCODE: China

13. As underlined in this paper, the use of internationally recognized code lists is essential for mutual understanding of the data that is being exchanged. One such example is UN/LOCODE.

14. UN/LOCODE – initially short for the United Nations Code for Ports and other Locations, and later renamed the United Nations Code for Trade and Transport Locations – is specified in UNECE Recommendation 16 as a five-character code to identify locations in a unique and unambiguous way. It provides a coded representation for the names of ports, airports, inland clearance depots, inland freight terminals, and other transport-related locations and trade-related locations that are used for the movement of goods.

15. UN/LOCODE is used extensively throughout the world by the international trade community. Since a first release in 1981, entries have increased from 8,000 to over 100,000 today, including locations in 249 countries, territories and special areas. It is mandatory to use UN/LOCODE for customs declarations and clearance in many countries. Some examples of standards and organizations that have adopted the use of UN/LOCODE are EDIFACT, the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the International Maritime Organization, and the WCO.

16. Since being adopted as a Chinese national standard (GB/T/15514) and obligatory for certain regulatory documents in China, UN/LOCODE has played an important role in facilitating international trade. For example, before Ruago port – a city in Jiangsu province on the eastern coast of China – was assigned with UN/LOCODE, exporters could only deliver goods to Shanghai to then be transported the rest of the journey by highway. For one importer of stone materials, this cost of about around 4,000 renminbi per container – acting as a significant cost draft. After a UN/LOCODE was assigned to Ruago port in 2014, the importer saved about 1.2 billion renminbi annually as the containers are delivered directly.

Electronic Single Window: Canada

17. In 2011 the Canadian Prime Minister Stephen Harper and US President Barack Obama announced a new initiative – Beyond the Border: A Shared Vision for Perimeter Security and Economic Competitiveness – pledging to develop common border practices, and streamlining customs processing and regulatory compliance. A joint action plan identified full implementation of an electronic single window as one of 32 joint priorities. Both Canada and the US were to convert to electronic form data requirements of all government departments and agencies participating in the initiative by 2013, as well as for border-related decision processes for at least the top four priority departments.

18. As the lead agency, the Canada Border Services Agency (CBSA) developed its Single Window in accordance with the UN/CEFACT Recommendation 33 (on establishing a Single Window); Recommendation 34 (on trade data simplification and standardization); and Recommendation 36 (on Single Window interoperability). CBSA also ensured that representatives from all relevant public and private sector agencies were involved from initiation through to implementation. Oversight, review and contribution were also made by stakeholders, including participating government departments and agencies (PGA), trade chain partners (importers, carriers, brokers and freight-forwarders) and international partnerships (UN/CEFACT, US Customs and Border Protection, the WTO, the WCO, and APEC).

19. The CBSA began with specific PGA needs assessments to assess the challenges associated with the cross-border movement of commercial goods. Input from policy experts helped to verify data definitions and established the necessity of the information to fulfil the mandate of the particular PGA and its associated programme(s) – resulting in the reduction of 1,800 required data elements to 80. The CBSA also worked with the PGAs to ensure that the proper legal authorities were in place to collect, share and store the data.

20. The CBSA chose to develop a Single Automated System (a single, centrally maintained submission system with which all authorities and traders have to interface) in accordance with industry Project Management Lifecycle principles and standards, designed to streamline the electronic collection and dissemination of commercial import data between the Government of Canada and the import community. Its creation established a solution for the commercial import process that balances the needs of government departments and agencies with today's globally competitive business environment through the development of the Integrated Import Declaration (IID) and the Document Imaging Functionality (DIF).

21. Three Risk Assessment Information Sharing Models were developed and could be customized to suit the needs of the specific PGAs and their programme:

- Model 1: PGAs review the IID data and provide an active recommendation to the CBSA
- Model 2: PGAs do not provide an active recommendation to the CBSA –instead the information on the IID is validated electronically by the PGA; and the CBSA maintains a list of PGA rules via a Business Management Rules System
- Model 3: Enhanced Pathfinder Delivery – provides participants with commercial trade data, currently collected by the CBSA, through the use of data extract files

22. With more timely, complete and accurate information provided by importers and brokers via the Single Window, the CBSA is in a better position to make release decisions. Automated functions such as business rule validation and the use of the DIF allows the agency to efficiently allocate border service officers. The PGAs, in turn, are able to perform more effective risk assessments when making recommendations to the CBSA. Additionally, PGAs are able to participate in real-time admissibility determinations along with the CBSA because of the advanced trade data and other technical means.

23. As of March 2017 10 PGAs and their 38 associated programmes were using the IID. Canada continues to ensure interoperability through continued collaboration with US customs. Efforts are also made to continue work with relevant business as well as ensuring ongoing alignment with international recommendations and standards through continued partnership with UN/CEFACT and in the ongoing development and implementation of the WCO Data Model.

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White Paper on Trusted Transboundary Environment

Ensuring Legally Significant Trusted Trans-Boundary Electronic Interaction

Summary

When exchanging information electronically, there can be questions of the legal significance of the data, in other words, if the information received is legally binding. Building on the work of UNECE Recommendation 14 on Authentication of Trade Documents, this White Paper aims to provide guidance on establishing a mutual recognition framework between countries in view of ensuring the legal significance of information, when higher levels of reliability are required or are desired. This is the Trusted Transboundary Environment. This work can eventually form the basis of future work on the subject.

This document is submitted to the twenty-fourth Plenary for noting.

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I. Introduction

1. The intention of this paper is to facilitate and encourage the creation of a trusted transboundary environment for the international legally significant exchange of electronic documents and data between public authorities, and natural and/or legal persons. This paper is intended for those parties interested in the establishment, operation and practical usage of such transboundary infrastructures.

2. The Internet has become a habitual tool and environment for obtaining electronic services for individuals and entities of various states. The advantages of such services are evident, but a number of organizational and legal issues prevent their widespread use in cases where parties require a certain degree of confidence in each other, and in the electronic services they use. One of the main issues is ensuring the legal validity of e-documents and the legal significance of electronic interaction in general. This problem is urgent on both the national level (within single jurisdictions) and the transboundary level (where interactions occur between participants acting under the jurisdiction of different states).

3. The following scenarios represent some examples where a certain *degree of confidence* is required:

- Electronic tendering procedures, especially the cases where the contracting authority is a governmental body or a big company. These authorities usually require a higher level of reliability for the trade documents of their economic operators.
- Certain trade and transport documents exchanged within cross-border trade procedures.
- Dispute resolution and settlement procedures including online dispute resolution. These procedures require the univocal identification and authentication of a plaintiff and defendant.
- Electronic insurance. There should be a mechanism for the reliable verification of an insurance certificate

4. The urgency of establishing national environments for paperless trade is mentioned in some regional arrangements for the facilitation of cross-border paperless trade such as the Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific issued by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). One of the purposes of this White Paper is to support Governments, and regional and international organizations in building up and managing these environments in an interoperable way.

5. As stated in Recommendation 14, UN/CEFACT advocates the removal of any excessive rulings, contracts or practices (when possible) to facilitate international trade procedures. Nevertheless, there remain trade-related scenarios where participants seek a high *degree of confidence* in each other. This White Paper facilitates exactly such scenarios.

6. This White Paper explores the principles of establishing and operating regional and global coordination organizations which ensure trust in the international exchange of data and electronic documents between participants interacting within an electronic framework (i.e. public authorities, and natural and legal persons).

7. This White Paper covers mainly organizational, and partially technological, provisions concerning trusted Information and Communication Technologies (ICT)

services. Provisions regarding the establishment of appropriate legal regimes may be elaborated by other bodies.

8. The general purpose of this White Paper is to help ensure the rights and legal interests of citizens and organizations while they perform *legally significant*[1] information transactions in electronic form, using the Internet and other open ICT systems of mass usage.

9. In order to achieve a higher *degree of confidence* in electronic interaction, this White Paper explores the establishment of a *Common Trust Infrastructure (CTI)*—a fundamental, easily scalable platform that includes dedicated, trusted ICT services and provides unified access to these services.

10. UN/CEFACT recognizes the principle of technological neutrality and does not propose any specific technology as a basis for a *CTI*. It is up to governments to choose the technologies which will provide the necessary *degree of confidence* in the electronic interaction. This White Paper focuses on organizational aspects of *CTI* and elaborates technical issues merely to the extent necessary for making the approaches applicable in practice.

II. Basic principle of Common Trust Infrastructure

11. Participants in electronic interactions typically deal with some kind of ICT service (email, cloud storage, web-portals, etc.). If such participants already have a sufficient *degree of confidence* in each other and in the ICT services they use, then nothing needs to be changed. But if the participants are not sufficiently confident in each other and/or in the ICT services they are using, then it may be appropriate to use a trusted third party to help increase the *degree of confidence* in the electronic interaction. The services provided by these trusted third parties are called *trust services*.

12. Within this White Paper, *trust services* may be of different types (provide different functions) and of different *levels of qualification*. *High level qualification trust services* are operated under one or more international agreements, and they meet the requirements and follow the rules laid out by international coordinators. *Basic level qualification trust services* are operated under one or more commercial agreements, and they may be established within, for example, some large scale international projects and follow the recognized best practices for trust service providers. *Trust services* should be audited in accordance with their *level of qualification*.

13. The aggregate of *trust services* operating within the legal, organizational and technical framework forms the *Common Trust Infrastructure*. The *CTI* is a fundamental, easily scalable infrastructure platform providing unified access to *trust services*.

14. The existing natural peculiarities of different world regions (historical, cultural, political, economic, technical, etc.) may result in different *levels of trust* within these regions concerning electronic interactions.

15. The primary objective of a *CTI* is to ensure *legally significant* electronic interactions between its users by providing *trust services* of different *qualifications* (zero, basic, high) to the participants of an electronic interaction.

[1] Attaching the attribute "legally significant" to an electronic interaction will require a legal framework that is outside the scope of this White Paper.

16. This institutional guarantee is to be ensured within the business activity of specialized providers which:

- provide users with a set of trusted ICT services;
- operate within established legal regimes, which include but are not limited to restrictions imposed by the processing of personal data; and
- operate within the context of a Common Trust Infrastructure.

III. *Common Trust Infrastructure* establishment principles

- **Scalability**. The CTI should be established in such a way that it can be easily scaled. It broadens easily at any level of consideration due to the accession of new participants, such as new jurisdictions; new supranational participants; new providers of trust services, and register systems.
- **Traceability**. If required by the participants of electronic interaction, any fact of electronic interaction within the CTI should be recorded and available for conflict resolutions if necessary.
- **Cost efficiency**. While deciding on a concrete variant of CTI architecture, the risk analysis should be taken into account. The CTI forming and functioning costs should be lower than possible losses caused by ICT-specific malfunctions and malicious activities.
- **Complexity**. Coherent elaboration of legal, organizational and technological issues should be performed during the establishment of a CTI. A complex description allows for the correct functioning of the system as a whole, and its single elements.

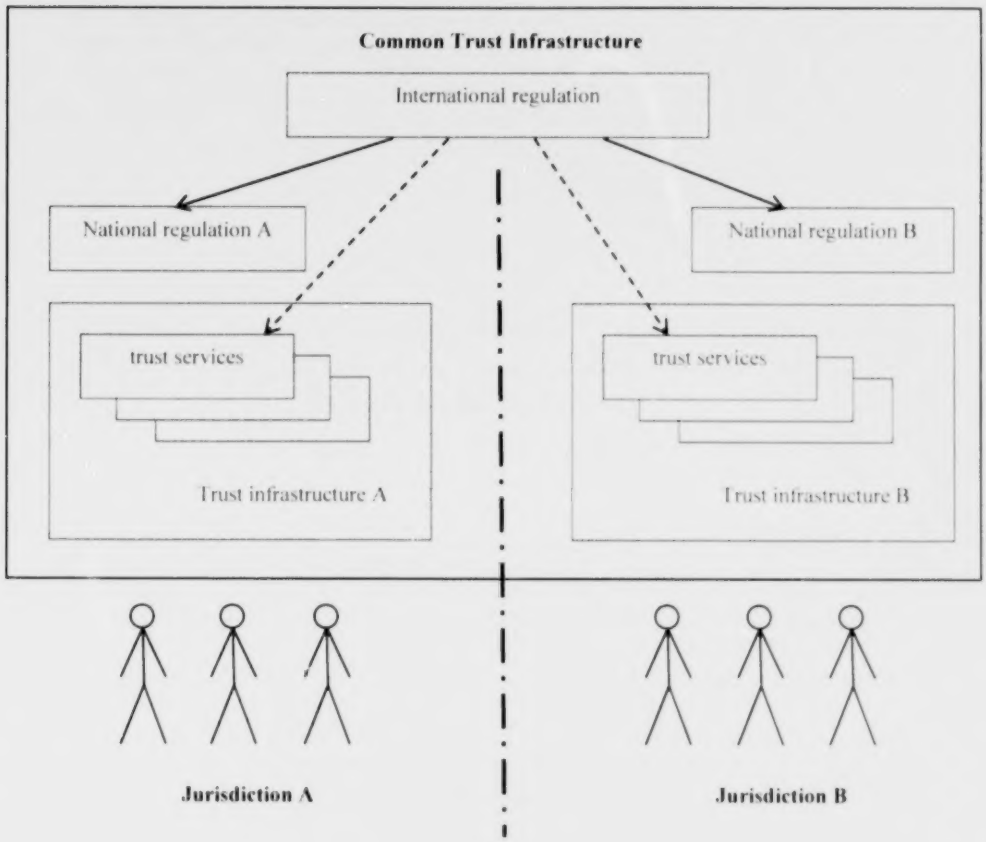
IV. *Common Trust Infrastructure* coordination approaches

17. The *CTI* architecture is selected according to the principles stated in the previous section. There are three levels of *CTI* coordination: legal, organizational and technological.

A. Legal Level

18. The *CTI* can be built on a single- or multi-*domain* basis. In the context of legal and organizational regulation, the multi-*domain* basis is the most complicated variant. Fig. 1 gives a general scheme of a possible approach to legal regulation. The dotted arrows depict the cases where a national regulation does not exist, or where it is not feasible.

Fig 1 Legal level



19. Legal regulation of *CTI* interaction can be divided in two parts: international and national. The international legal regulation is carried out on the basis of the following types of documents:

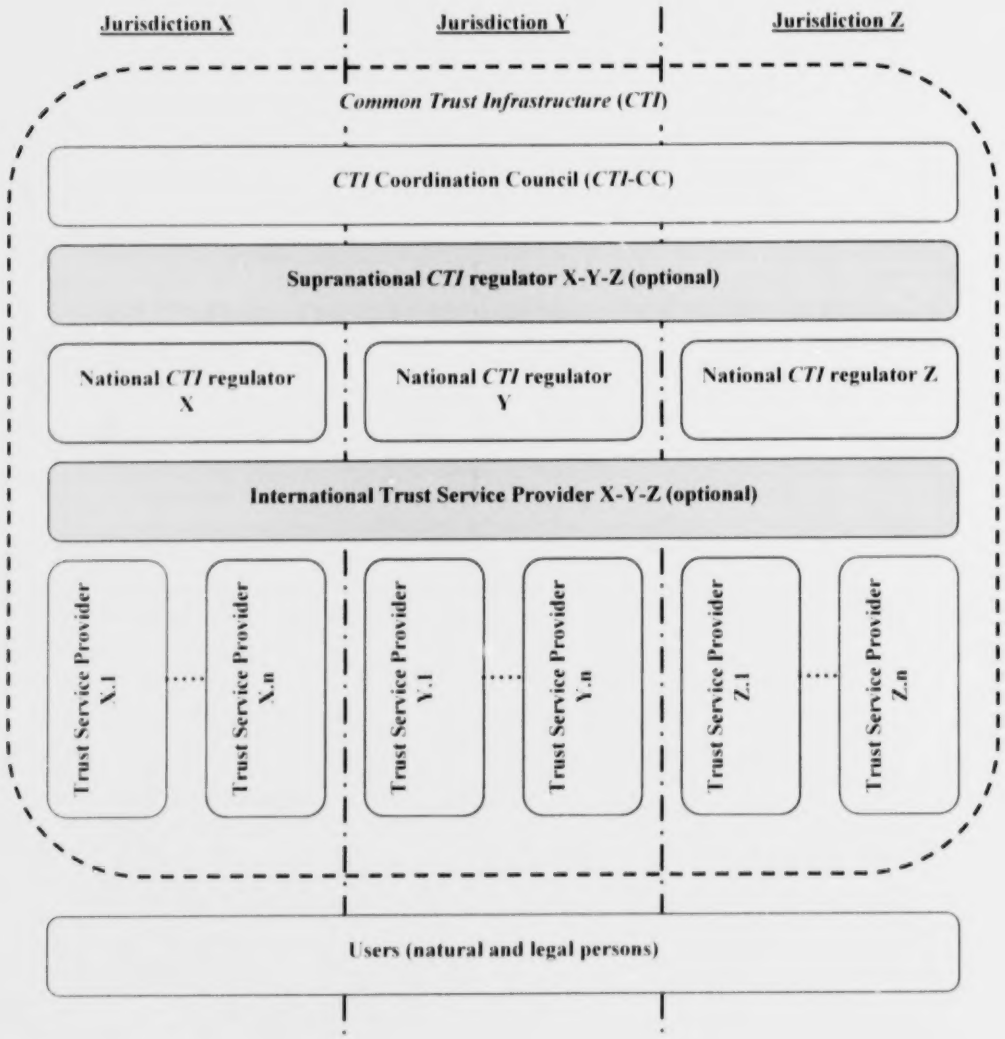
- international treaties/agreements;
- acts of different international organizations;
- international standards and regulations;
- agreements between participants of transboundary electronic interaction on given issues;
- model acts.

20. The national legal regulation is built on a complex of normative documents that are standard in each particular jurisdiction.

B. Organizational Level

21. Mutual *legally significant* recognition of electronic documents and data treated by *trust services* provided under various jurisdictions could be reached through the creation and operation of a dedicated body (in this example called a *CTI* Coordination Council or *CTI*-CC) that includes national regulation bodies having voluntarily joined the *CTI*-CC. The activity of *CTI*-CC could be regulated by a *CTI*-CC Statute which should be recognized and signed by all its authorized members – that is the Regulation Bodies of the Electronic Data Exchange represented primarily by the National *CTI* Regulators. Fig. 2 gives a general scheme of the organizational level of coordination. The optional elements are identified by grey blocks.

Fig 2. Organizational level



22. The *CTI*-CC issues a number of documents interconnected with its Statute:

- **Requirements** for the CTI-CC members, compliance is a prerequisite for full membership in the CTI-CC;
- **Guidelines** for carrying out 'shadow' supervision for admittance to the CTI-CC and periodic mutual audit for maintaining voluntary membership in the CTI-CC;
- **Compliance criteria** which are to be met by providers of the trust services, and the methodology for applying these criteria;
- **Scheme of estimation/verification** of providers of the trust services with respect to their meeting these criteria.

23. In the *CTI*, each jurisdiction is represented by a National *CTI* regulator (see Fig. 2) which regulates the activity of providers of the *trust services* within its jurisdiction.

24. For groups of member states with a high degree of integration (for example, Eurasian Economic Union member-states or European Union member-states) there is a possibility of constituting a Supranational *CTI* regulator (Fig. 2. Supranational *CTI* regulator X-Y-Z). In such case, one Supranational *CTI* regulator X-Y-Z substitutes for a group of National *CTI* regulators X, Y and Z.

25. The natural *CTI* scalability is enabled through the procedure for admitting new members to the *CTI*-CC (new national and supranational participants) and the scheme for verifying that the providers of the *trust services* meet the *Compliance criteria* issued by the *CTI*-CC (new providers of the *trust services*).

26. International providers of *trust services* can provide, inter alia, neutral inter-domain gateways as a specific type of *trust service*. The main function of an inter-domain gateway is to provide for mutual recognition (legalization) of electronic documents and data. These inter-domain gateways connecting single *domains* represent the elements in building a *CTI*.

27. Inter-domain gateways can be established simply, at the legal and organizational levels; and at a complex level (legal, organizational and technical).

28. In the first case, the communicating *domains* establish a common legal basis for cooperation between them (see 'Legal level' section above). This legal basis defines the full set of requirements, conditions and prerequisites, enabling and even guaranteeing a mutual legal recognition (legalization) of *legally significant* electronic documents.

29. On the organizational level, procedures and processes of interaction between different *domains* shall uphold the *level of trust* between these *domains* as being sufficient for a mutual recognition (legalization) of electronic documents and data issued in different *domains* or jurisdictions.

30. In order to achieve this necessary *level of trust*, this set of the requirements, conditions and prerequisites shall regulate, inter alia, the establishment and operation of a neutral international environment, i.e. an environment outside (beyond) any single *domain*. The *CTI*-CC and International trust service providers represent parts of this neutral international environment. Such a neutral international environment could be operated in a neutral legal field that is defined by an international body.

31. In a situation where inter-domain gateways are established at only legal and organizational levels, these inter-domain gateways are implemented merely by treaties, agreements and organizational procedures. This legal and organizational infrastructure may be supported by different single *trust services* like e-signature verification, powers verification, time stamping etc., but without a specific *trust service* dedicated to the purpose of being a gateway.

32. In the second (complex) case, when inter-domain gateways are established at legal, organizational and technical levels, inter-domain gateways additionally transform a document in such a way that it will fulfil the requirements (attributes, format, structure, etc.) for *legally significant* electronic documents in a recipient's *domain*[2] (jurisdiction). In this way, the inter-domain gateway *trust service* can substitute for a number of *trust services* that provide only single specific functions (e-signature verification, powers verification, time stamping etc.). As ever, technically implemented inter-domain gateway *trust services* shall also be operated in a neutral international environment.

33. Approaches to forming inter-domain gateways should consider the usage of transition profiles describing and configuring transitions from one *domain* to another. These transition profiles should take into account, inter alia, the legal basis of the cooperation between the communicating *domains* as well as the *levels of qualification* of the identification schemes used inside the interacting *domains*.

34. In order to become a National Trust Service Provider, a supplier of these services should undergo accreditation with the National *CTI* regulator of the same jurisdiction. International Trust Service Providers should undergo accreditation with the *CTI*-CC. The requirements for accreditation of the providers of the *trust services*, and the requirements of their activity, should be regulated by the compliance criteria issued by the *CTI*-CC, and possible national supplements issued by the respective National *CTI* regulator.

35. In the *CTI*-CC, the users of electronic services could be both individuals and legal entities. The users select the necessary *level of qualification* of a *trust service* at their discretion, or in an agreement.

36. The services should be provided by the respective suppliers—the *trust service* providers. The *trust service* providers should be integrated by the *CTI*.

37. The *trust services*, as the *CTI* elements, could be variously realized depending on the *level of trust* between *domains* (jurisdictions). For example, with a conditionally 'high' or 'medium' level of mutual trust between the *CTI* members, it is efficient to use centralized International *trust services* applied according to agreed-upon standards. In the case of a conditionally 'low' *level of trust*, the *trust services* are built according to the decentralized principle—national *trust services* in each single jurisdiction.

C. Technological level

38. There can be a great number of technological options for *trust services*' realization. The main requirement of the *CTI* elements is interoperability. Regulation at this level is carried out by the application of different standards and instructions set forth by the *CTI*-CC documents.

39. This White Paper recommends close cooperation with major technical standardization organizations such as ISO, ETSI, W3C, CEN and others in order to achieve the necessary coordination on the technological level[3].

[2] 'Domain' or 'trust domain' can coincide with a single jurisdiction or can unite several jurisdictions

[3] International Organization for Standardization (ISO), European Telecommunications Standards Institute (ETSI), World Wide Web Consortium (W3C), European Committee for Standardization (CEN)

V. Trust infrastructures services: approaches to ensure technical interoperability

40. To determine *trust services* types it is advisable to consider whether a base document's attributes are necessary to fulfil the document's legal function.

Table 1: document's attributes necessary to fulfil its legal function

No.	Attribute type	Mandatory yes/no	Description / comments
1.	Content	yes	An aggregate of at least one of the following attributes is the content—the informational essence of a document irrespective of form (i.e. paper or electronic): 1) document type 2) document classification 3) document title 4) table of contents 5) document body (mandatory) 6) annexes Herewith, information integrity and authenticity are to be assured when processing, storing and transferring.
2.	Document issuer legal status	yes	An aggregate of the following attributes is the document issuer legal status: 1) logo type 2) name of an issuer 3) issuer reference data (address, contacts etc.) 4) seal impression
3.	Signatory status (powers) or signatory position	no	A brief description of signatory powers with their duration stated.
4.	Signature	yes	An aggregate of the following attributes is the signature: 1) issuer's signature 2) signature stamp of confirmation 3) signature stamp of approval 4) visa (clearance / endorsement stamp) 5) copy certification stamp 6) seal of issuing organization 7) etc.
5.	Time	yes	A statement of the time of signing, attached on the basis of a trusted time source (the validity aspect).
6.	Place	no	A statement of the place of signing (the place where the Signatory expressed his/her will to sign by triggering signing) is optional. If this type of service is not available, the attribute place can be considered as one of the content attributes.

41. Basic *trust services* types (trust services functions provided depending on concrete demand) are:

a. Creation, verification, and validation of signatures and seals

b. Monitoring of legal status

c. Creation, verification, and validation of time stamps

d. Providing neutral inter-domain gateways

Note: If there is a gateway between domains (jurisdictions), there should be a profile for this inter-domain gateway based on an agreement between these domains. Each inter-domain gateway profile should "know" what attributes are mandatory for each domain. On the technological level, an inter-domain gateway should implement some protocol translation or translation of different protocols or standards from one domain to another. For the mathematical description of inter-domain gateway functions please refer to Annex 2. Trust services (including inter-domain gateways) work with national identification schemes on the one hand, and with international trust infrastructure (other trust services) on the other.

e. Providing identification of natural and legal persons

42. The following attribute types (see Table 1) presume a previously performed identification of related natural or legal persons:

- document issuer legal status
- signatory status (powers) or signatory position
- Signature

43. The *trust service* types a) and b) use these attribute types and, hence, also presume a previously performed identification of related natural or legal persons. The identification services are provided by providers specialized in performing identification. These services can be implemented on different *qualification levels*: zero, basic and high. The *CTI*-CC shall decide/agree upon eligible identification schemes, including minimal requirements on them. There may be *CTI*-CC specific identification schemes and/or references to international standards and/or references to notified identification schemes inside a single *domain*.

44. Sets of identification attributes and identification procedures themselves can serve as the basis for the definition of the *qualification levels* of identification schemes. The *qualification levels* of identification schemes can be of essence for the regulation of interaction between different *domains*. Sets of identification attributes can be defined by the legal regimes for the business activity of providers specialized in performing identification and of functional providers. Sets of identification attributes can be maintained by the *trust services* (identification service). The activity of providers specialized in performing identification can be regulated by special organizational and technical requirements created to ensure personal data protection.

45. Note: Long-term archival and related verification services can be realized as a function of ICT service or as a function of a special trust service type.

46. Note: Existing electronic systems should be taken into account so that requirements for their updating and connection to the *CTI* may be minimal.

VI. Common Trust Infrastructure services levels of qualification

47. The *level of qualification* of a *trust service* is a function of the trust service to evidently fulfil a predefined set of requirements.

48. There can be distinct incremental *qualification levels* of a *trust service*. The lower the degree of confidence of the participants in each other and in the ICT services

processing electronic interactions (i.e. creation, access, transformation, transmission, destruction, etc.), the higher the demand on the *qualification level* of *trust services*.

49. The characteristics of the *levels of qualification* of *trust services* are described in the following table.

Table 2: characteristics of the levels of qualification of trust services

	Degree of confidence participants have in each other and in the ICT services		
	High degree of confidence	Substantial degree of confidence	Limited degree of confidence
levels of qualification of trust services	No trust services required ('zero' level of qualification)	Basic level of qualification	High level of qualification
legal regime of operation of trust services	n/a	Based on commercial agreements and/or common trade practice	Based on international agreements (conventions) and/or on directly applicable international regulation[4]
Organizational architecture of trust services	n/a	Large Scale Projects of any kind	*CTI*- Coordination Council (*CTI*-CC), see Title IV above
Technological requirements on trust services	n/a	Meet the recognized best practices for trust service providers	-- Meet *CTI*-CC Compliance Criteria AND -- Meet the requirements laid down in the applicable national regulation (for national trust service providers)

50. If *trust services* engaged in document lifecycle (incl. the chain of inter-domain gateways between the document's issuer and recipient) have different *levels of qualification*, the overall *level of qualification* is equal to the lowest of them.

VII. Communication with organizations in different areas of standardization.

51. This White Paper suggests creating a description of different possible legal regimes:

- based on international agreements (conventions) and/or on directly applicable international regulation;
- based on commercial agreements and/or common trade practice;
- without special international regulation.

52. Legal regimes can be additionally supported by traditional institutes (governmental authorities, judicial settlement, risk insurances, notaries public and others) through mutual recognition of electronic documents secured by *trust services*.

[4] E.g. *trust services* operated in accordance with EU Regulation (eIDAS) or Eurasian Economic Union Agreement and other documents.

53. Established legal regimes can also be used to impose special requirements on the materials, and financial support of the business activity of specialized providers in case of damage to their users, including cases of compromised personal data.

54. Institutional guarantees and legal regimes for constituting and functioning regional and global transboundary trusted environments should be considered in a separate document by a specialized body

55. This paper suggests describing the mechanisms of interaction between particular states and their international unions with other international formats within the framework of creating a common transboundary trusted environment.

a. by means of the complete or a partial joining of a state to an existing legal regime on the basis of international treaties and/or directly applicable international regulations, in the context of which a task on forming a regional transboundary trusted environment has already been set or solved. This existing legal regime ensures institutional guarantees to the subjects of electronic interaction.

b. In the context of interaction between different international unions:

- In the first stage, a group of states creates a regional domain ensuring institutional guarantees for the subjects of electronic interaction within the legal regime specified by these states;
- In the second stage, the protocols of trusted interaction with other international unions are specified as related to mutual recognition of different legal regimes. This mutual recognition shall pertain to institutional guarantees and information security requirements concerning each of the international formats, possibly on the basis of an inter-domain gateway being operated within the framework of an international legal regime.

c. In the context interaction of a state with other states or international unions:

- In the first stage, a state creates its own domain functioning in the framework of a national legal regime specified by this state;
- In the second stage, the protocols of trusted interaction with other states and/or international unions are specified as related to mutual recognition of different legal regimes. This mutual recognition shall take in account institutional guarantees and information security requirements pertaining to these states and international formats, possibly on the basis of an inter-domain gateway being operated within the framework of an international legal regime.

VIII. Communication with international organizations in different areas of standardization on the technical and organizational aspects of forming a functioning transboundary trusted environment

56. This White Paper suggests taking into consideration the following aspects of standardization:

Technological Aspects

57. The main objective of standardization in this area is facilitating technical interoperability within the transboundary trusted environment. This should cover all technical aspects that necessarily impact functional and security interoperability like documents and data formats, communication protocols, format and protocol conversions,

technical interfaces, the equivalence of the assurance (security) level of technical components, etc.

Organizational Aspects

58. The main objective of standardization in this area is to support a *level of trust* between domains as being sufficient for a mutual recognition (legalization) of electronic documents and data, which are issued in different *domains* (jurisdictions). This includes, but is not limited to, procedures for performing conformity audits of *trust service* providers by independent conformity assessment bodies; for accrediting these conformity assessment bodies; for mutual "peer-to-peer" audits between the members of the *CTI* Coordination Council, objects and areas subjected to the audits and the applicable audit criteria.

59. The specified aspects should be considered as they are applied to different *levels of qualification* of *trust services*. If a *trust service* with a lower *level of qualification* interacts with a *trust service* with a higher *level of qualification*, the whole *level of qualification* of the interaction between both *trust services* will be, at most, equal to the lower *level of qualification*.

Annex I

Glossary

Italic face indicates the terms defined for the purposes of this White Paper.

For the purposes of this paper the following terms apply:

- ***Common Trust Infrastructure (CTI)***
  - An infrastructure designed to help ensure the *legal significance* of transboundary electronic interaction. *CTI* provides a set of *trust services* harmonized on the legal, organizational and technological levels.
- ***Degree of confidence*** (of the participants of electronic interaction in each other and in the ICT services processing the electronic interaction between them)
  - A societal function of an established or felt degree of confidence of the participants of electronic interaction in each other and in the ICT services processing the electronic interaction between them.
- ***Legal significance*** (of an action)
  - A property of an action (of a process) to originate (to result in) documents (data units) possessing *legal validity*.
- ***Legal significance*** (of a document)
  - A property of a document (data unit) to change the legal status of a subject of law (a natural or legal person who in law has the capacity to realize rights and juridical duties).
  - A *legally significant* document is always also a *legally valid* one with concrete content.
- ***Legal validity (also called 'legal force')*** (of a document)
  - A property of a document (data unit) to be applicable for judicature, i.e. be deemed to have satisfied the requirements of applicable law. The *legal validity* is conferred to a document by the legislation in force, by the authority of its issuer and by the established order of its issuing (e.g. it shall be usable for a subsequent reference).
- ***Level of qualification*** (or qualification level) (of a service)
  - A property of a service to evidently fulfil a predefined set of requirements.
- ***Level of trust*** (between domains)
  - A societal function determining the degree of trust between *domains*.
  - Depending on an established *level of trust*, *domains* are prepared to share a certain amount of resources and to jointly use certain infrastructures; i.e. *domains* are prepared to delegate part of their inherent powers, functions and resources to a *common trust infrastructure* (*CTI*), in which they jointly trust. The higher the *level of trust* in this *CTI* the more inherent powers *domains* are prepared to delegate to the *CTI*.
- ***Domain*** (trust domain)

- Informational and legal space using the same *CTI*. A *domain* can coincide with a single jurisdiction or can unite several jurisdictions.

- ***Trust service***
  - (high level definition) - an electronic service aiming to ensure a certain *degree of confidence* between the participants of an electronic interaction.

- ***Trusted electronic interaction***
  - The exchange of any data in electronic form in such a way that a user of this data undoubtedly accepts it according to its operational policy. Each user's operational policy determines whether the electronic interaction is considered a trusted one. Hence, the determination of the trustworthiness of data received in an electronic exchange varies from one user to another. Any electronic interaction utilizes information and communication technology services (such as an internet provider, email provider, message exchange services of any kind, cloud storages, etc.); however, *trusted electronic interaction* is provided by using *trust services*.

Annex II

Mathematical description of inter-domain gateway functions

The set of rules to translate the related requirements between two domains A and B should be laid down within an inter-domain gateway.

$A=\{a_1, a_2, \ldots, a_N\}$

$B=\{b_1, b_2, \ldots, b_M\}$

$F(a)=A \rightarrow B$

Where A is the set of requirements (attributes) for domain A, B is the set of requirements for domain B, and F(a) is the set of transformation rules from A to B. Keeping in mind that the power of the sets (i.e. the quantity of requirements) in a real-world scenario may not be equal ($N \neq M$), there should be rules defined to lead both sets to equal power K where $K=MAX(N, M)$.

The degree of trust to this set of transformation rules can be defined as transformation to some universal superset of requirements, and such transformation is performed inside each domain.

$F(a)=A \rightarrow X$

$F(x)=X \rightarrow B$

Where X is a universal superset of requirements for A and B.

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White Paper on Data Pipeline Concept for Improving Data Quality in the Supply Chain

Summary

This White Paper builds upon the work that was undertaken by several European Union projects (Cassandra, CORE, SELIS) and which was brought to UN/CEFACT in order to provide a consistent definition and understanding of what is a Data Pipeline and how it should function. This paper also explores the possible information which can be input or output from a Pipeline at various "waypoints" along the life cycle of a transaction.

This document is submitted to the twenty-fourth session of the UN/CEFACT Plenary for noting.

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I. Background

1. The supply chain of today is much more complex than it has ever been, yet the data flows are still built around traditional paper-based processes that no longer satisfy today's requirements. The need for accurate, timely data through a supply chain is now a standard requirement from the commercial sector, yet the data provided by multiple parties is often re-keyed several times, typically open to interpretation or watering down to populate various types of documents that are passed between parties to support regulatory, financial or operational requirements. This is often done without consideration of where those documents will go or who will use them and for what purpose beyond the initial recipient.

2. This document-based approach does not adequately support today's requirements. With the increased automation that businesses are implementing into their warehouses and the advancements made in artificial intelligence (AI) and predictive analytics, the quality, timing and accuracy of data is more important than ever.

3. Consider the damage that inaccurate data could cause to a business when used unknowingly in decision making and planning, as well as financial forecasting. A white paper by Professors Alan Braithwaite and Richard Wilding estimates that data inaccuracy among the United Kingdom top five retailers and their suppliers is costing as much as 1.4 billion pounds sterling per year – 1 per cent of their total revenue.[1]

4. When commercial parties understand the risks, manage them, purchase goods using appropriate International Commercial Terms (Incoterms) and have visibility of their supply chain movements, they can manage the exceptions from real time data, and control the flow of goods into their business. This allows them to keep unexpected costs to a minimum and give a true and consistent landed cost for their goods. Businesses have demonstrated a 30 per cent reduction in their international supply chain costs using this approach.[2]

5. Border agencies also face increasing volumes of cargo traffic at borders, due to larger vessels/aircraft and an increasingly globalized approach to the way products are bought through less traditional methods, but now more commonplace channels, such as e-commerce platforms. Dealing with this increase in volume demands resources and the use of the correct data to enable efficient risk assessment and clearance to take place. It is indicated that a 50 per cent reduction in regulatory administration at the border could be worth 370 million pounds sterling.

6. However, poor quality data is all too often presented to these border agencies through the use of a manifest. This data is sometimes third or fourth hand and rarely comes from its true source. Freight forwarders often identify themselves or their overseas agent as the shipper and consignee on transport documents such as the bill of lading, making it increasingly difficult to identify the true parties related to the goods. In addition, industries like insurance companies may stipulate that 'terms' such as 'said to contain' need to be added to a bill of lading which leads to the use of data too imprecise when provided to the applicable border agency. Inaccurate or late data presents challenges and creates inefficiencies at borders around the world.

7. Trust in the data quality and source of the data is key for the industry as a whole to move away from the 'paper safety net'. Lack of trust in the data is hindering global trade facilitation and the move to true digitalization of the supply chain. Paper free initiatives in all modes of transport are yet to become widely adopted. For example, in sea freight many

1 SupplyChainStandard.com - Data inaccuracy costs retail 1.4 billion pounds sterling - viewed 2 July 2010: www.supplychainstandard.com/ICArticleID/29/Articles/9048/Data+inaccuracy+costs+retail+14+bn.html

2 D10.4 CORE Final report on phase two developments of the Felixstowe demonstrator

bills of lading are still made up of three originals and require six copies and even digitizing of the documents isn't acceptable for many.

II. Pipeline

8. The concept of a data pipeline allows data that originates at its source to be provided once and used multiple times throughout the supply chain, regardless of the mode of transport, party or border agency that needs to access the data.

9. In the pipeline concept, information is structured around waypoints when information is injected into the pipeline ("input waypoints") or when information is extracted from the pipeline ("output waypoints"). Various events take place in the process and movement of goods and these can potentially be "input waypoints", "output waypoints" or both.

10. There is commonality of these waypoints across all modes of transport. For example, goods need to be loaded onto a means of transport and need to be delivered to a location. Throughout the movement there are many waypoints that can take place which may trigger an important related event such as payment for the goods or transportation service which may demonstrate change of ownership or responsibility. These events can trigger a push of data or a pull of data for those that have the required access to this type of data.

11. During the Buy, Ship, Pay process that takes place, various data is captured and logged for use in the sales contract, invoicing process and the physical movement of goods. Rather than documents being passed through the chain on request or as a matter of course, the focus should be around making the required data available to those who need it for a specific purpose. This data should be captured upfront and made available using channels where the security of the data is contained and restricted for those that require it. This data should be entered into the pipeline as close to the original source as possible, and preferably directly from the systems that generate the data to show compliance and remove the possibility of illegal or erroneous tampering. The consignor knows more about the goods than any other stakeholder; hence, they are a key actor in the pipeline concept.

A. Principles

1. Capture the data from the right person at the right place at the right time

12. Capturing data at or as close to its source as possible is a key pipeline data carrier principle and offers multiple benefits to the actors in the supply chain. Data quality can be improved as the actors providing the data (the right person) access it at its origin (the right place) and so are able to provide reliable and detailed data elements to the Pipeline Data Exchange Structure (PDES).

13. Capturing key information at its source, rather than later on in the supply chain, removes the need to rely on data which has been re-entered by other actors, eliminating the risk of error or data misinterpretation. Data availability is also enhanced (the right time), as data will be input earlier and hence available for inclusion in data sets destined for cross-border agencies. Logistics and commercial planning and organization can also benefit.

14. For some, capturing the data from the source can be a challenging situation. For many actors in the supply chain they may resist as they have never had to provide this type of data before. Commercial understanding of the reasons why this is important need to be explained. It could form part of the sales contract or price negotiation as it would be considered a valued service and savings would be obtained further down the supply chain.

15. Regulatory bodies are increasingly upstreaming the compliance frontier further up the supply chain, for example in air freight the Pre-Load Advance Cargo Information for security filing is demanding data earlier in the transportation movement.

2. Capture once and use many times in the supply chain

16. A second important principle is that not only is pipeline data collected early on in the movement of goods along the supply chain, but once a data element is included in the pipeline data exchange structure, it does not need to be re-entered. This reflects the single window principle of sharing electronic data as defined in UNECE Recommendation 33.[1] Data re-entry is reserved exclusively for data elements that have changed or need correcting. The pipeline data exchange structure makes it possible for the data elements to be used by multiple cross-border agencies, avoiding the need to resubmit data for each agency. For certain types of data such as parties (buyer, seller) the use of external trusted data source(s) could be included to provide certainty.

B. Capturing information at source

17. Data captured from the source of the information provides more certainty that the information provided is correct at that point in the process. The consignor is a key actor to start the data capture in the transport process. The consignor knows more about the goods than any other actor in the supply chain at that point in time and in most cases, they are the last actor to physically touch the goods before being sealed for transport. This data used for customs declarations (export or import) will be more faithful to reality as declarants can provide information coming from the source.

18. The transport provider will also provide key insight around the journey of the shipment. Many road hauliers provide GPS tracking data. Ports, sea freight and air freight carriers, provide actual events that take place in the transport process, that are beneficial commercially as well as from a risk perspective. For example, ports of call on a shipment, arrival or departure dates all mark key points and are available electronically.

19. More advanced providers of data exist and can easily be integrated into the pipeline using more digital automated methods. For example, "Internet Of Things" (IoT) devices on containers, at ports and weigh bridges all provide the opportunity to 'digitally link' the events or waypoints of transport movements.

20. Participating businesses which are prepared to voluntarily provide advanced data can and will also provide input data back to the pipeline. For example, 'goods receipt' at their warehouse and confirmation of package totals received. It is beneficial for them to do this as the data could be fed back through output waypoints to the customs authorities to correct or amend the import customs declaration from the simplified declaration made before the container is opened or pallet unpacked.

21. Sources of data must be augmented to provide the whole data set for the PDES. No single party can capture everything for every shipment as the nature of supply chains is that it is multi party. For this reason, data provided should be limited to that which is originating and known to be true to that source, at that point in time. The data around the goods, augmented with transport data and security data, forms a complete and neutral picture of what actually took place during the movement.

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[1] UNECE Recommendation 33, 2005.
http://www.unece.org/fileadmin/DAM/cefact/recommendations/rec33/rec33_trd352e.pdf

C. Output waypoints: extracting information from the pipeline

22. Data contained in the pipeline can be extracted by the authorized actors by using two methods, push or pull.

- Push Methodology - Some regulatory agencies desire data to be pushed to their data repositories. They then store this data and use it to assess risk and provide historical retrospective in their own internal systems.
- Pull Methodology - Some regulatory agencies desire a pull process where and when they can request data using a secure access token or similar. They plan to evaluate risk internally in their own systems. If a shipment is selected for inspection they can request the data and its history to re-evaluate the risk and make a decision without the need for a physical inspection or manual intervention to provide documentation.

23. Both methods have their advantages and drawbacks; however, commonly both require the use of a structured, standardized data model. This reduces the development effort and the data analytics energy required to make sense of the data and provide certainty of the data fields of interest to the local regulatory agencies.

24. This push and pull methodology can be adapted for output waypoints between commercial actors as well. In these cases, the relevant privacy and data ownership aspects would need to be addressed bilaterally or multilaterally. These methods could also be used for data exchange between data pipeline providers.

III. Building a pipeline carrier

A. Basic principle

25. It is important to identify the actors who will be providing the input waypoint data ahead of time and enable them to contribute to the PDES.

26. When building a PDES there needs to be a clear path for inbound data to be captured at the right place and added to the overall pipeline carrier. The data would be added in blocks or snippets which relate specifically to new or updated data that is being captured from that source. It is important that data that is specific and known to be true at the input waypoint is what is being completed, and not to provide 'passed on' or 'hearsay' information that cannot be proven. Some input waypoints will contain 'planned' data; for example, the route plan for the transport movement. This type of data can be used to predict or estimate when something should be happening and provide exceptions when it does not happen. This, in turn, improves business planning, targeting and risk assessment.

27. The use of web services would assist with the capture and validation of the information for the providers and recipients, given that the stakeholders agree on message protocols and related services.

28. Ideally, the captured data should be timestamped and recorded for auditing, as well as identifying the source and location of the data capture for further analysis by risk assessment tools.

29. Missing data can be identified by exception management. The transport departure confirmation would be expected by the planned time noted in an earlier input waypoint. If it is missing, the data can be queried with the relevant party or source automatically.

30. Due to the number of actors and data capture points that could be automated using IoT devices, the environment is well suited to the use of Distributed Ledger Technology (DLT) such as Blockchain.

B. Use of standards

31. The PDES is intended to be a model that anyone could use and eventually exchange from one Pipeline data carrier to another. If this is to be the case, the use of internationally recognized standards is essential. Information must be unambiguously understood between the sender and any party that is authorized to receive the information.

32. The standard is important on several levels, including:

i) Firstly, the data element level to ensure that the semantics are understood to be the same across all participants.

ii) It is recommended to codify information when possible in order to avoid misunderstandings due to language or spelling differences; such code lists and data types must also be standardized in order to be mutually understood.

iii) The message structure should also be standardized as information is very rarely flat, but it is often hierarchal bringing information into relation with other information (for example, a seal should be associated to the container on which it is affixed; or the postal code should be associated to the party to which it is related).

iv) The standardization of the exchange protocol can also facilitate the exchange of information, though this can be less critical than the three other levels of standards.

33. The UN/CEFACT Pipeline project includes this paper and the technical artefacts that standardize the data, the code lists, the data types, the message structure (the PDES) and it also provides a suggested XML message format for the data exchange. UN/CEFACT standards are the most pertinent for this type of message because of the inherent business nature of the information being shared and the potential business and regulatory use of these. All of these deliverables are available on United Nations websites free of charge and all registered experts are invited to participate in its development and subsequent maintenance, also free of charge.

C. Input waypoints: adding data into the carrier

34. Information can be integrated into the PDES as a submission of a full document. However, in this case, information may be redundant as documents often repeat information that was established earlier in the data exchange. In this case, redundant information should not overwrite previously submitted information unless it could be considered the data source (for example, the estimated time of departure of the means of transport might be provided earlier in the transaction, but the operator of the means of transport is the source for the actual time of departure and their data should be able to overwrite a previously sent estimation).

35. Information can be integrated as part of an exchange of data in a process-oriented approach. An Enterprise Resource Planning tool (ERP) might be able to provide snippets of information as they become available instead of waiting for the establishment of a traditional document. Similarly, information can be integrated through IoT devices such as smart containers, smart devices, warehouse scanners or other.

D. Change of information

36. Data captured through the pipeline should in almost all cases be actual data that is true at that point in time. The amending of data should not as a rule take place; however, some waypoints can capture and provide the 'planned' route or 'estimated' arrival dates, which by nature are variable. At each input waypoint, the latest advised estimates for these events or factors could be provided.

37. If information is found to be incorrect after the time that it was provided it could be resent and could update the pipeline carrier; however, the new data should be time stamped and a flag set to indicate change after the event to provide those looking at pipeline data assurance that the data hasn't been tampered with. Only the original actor should be able to amend their waypoint data to maintain integrity. The challenge that amending data provides is one of lack of trust. If the data changes frequently or is being 'cleaned' before sending, it will not enable true automation in the supply chain. For example, if the data is being used in a distributed ledger technology, a 'smart contract' may be triggered once the data has entered the ledger. It is then too late to 'roll back' the outcome of that contract. For this reason, the changing of information once submitted should be carefully considered if appropriate for the intended use case.

IV. Data waypoints

38. Waypoints are the definitive moments in a supply chain when information is exchanged. Not all waypoints need to be used each time, but there should be a defined list so that pipelines can be implemented across all modes of transport and have a common understanding by all.

39. Some common input waypoints could be:

Event / Input Waypoint Status Code from UNECE Rec24	Type of Data	Actor / Role / Source	Description
Sales contract	• Buyer • Seller • Despatch and delivery party • Country of origin • Harmonized System Codes • Commercial document reference (invoice number or other) • Commercial (invoice) value of goods • Quantity of goods ordered • Planned place of delivery • Payment and delivery conditions such as Incoterms	Buyer / seller	The sales contract is the source of many of the subsequent exchanges on a supply chain. It provides details about the goods that are being sold (commercial value, HS codes…) and the parties that are involved. An important part of risk analysis and logistics planning for the PDES finds its source in this event.

Goods booked for transport Rec24 status code 6 (Booking Completed)	• Number of packages for shipment • Weights • Special handling instructions (perishables, dangerous goods information, temperature control) • Means of transport ID • Port of loading • Planned time of departure • Planned port of discharge • Planned transport route • Freight rate	Transport service buyer or transport service provider	The point at which goods are booked with a transport service provider and space allocated for that movement. The transport may take place over multiple shipments under a single transport-sales contract, so some of the information provided from previous waypoints would need to be provided again for that specific movement, for example number of packages.
Transport contract (shipping instruction)	• Actual point of departure/collection • Actual date of collection • Carrier • ETA - estimated time of arrival	Transport service buyer or transport service provider	The instruction for shipment and production of the transport contract (e.g. bill of lading or road consignment note CMR) from the transport service provider to the carrier. Usually done before the shipment takes place but not unusual to provide after the shipment has taken place.
Goods loaded for transport Rec24 status code 13 (Collection / Pickup Completed)	• Actual arrival time at pickup place / the place of acceptance • Actual departure time from pickup place / the place of acceptance • Container number • Seal ID(s) • Container verified gross mass (VGM) weight [method 2]	Transport service provider	The point that the goods are physically loaded onto or into a means of transport to begin the transportation. The goods may be 'sealed' into a loading device such as a container or unit load device (ULD). This is the point when liability for the goods is taken over by the Transport Service Provider under the terms of the Transport Contract.
Arrived at port of loading Rec24 status code 364 (Arrival at Yard)	• Actual time of arrival at the port of loading • Power or plug in provided for temperature-controlled goods and devices • Container verified gross mass (VGM) weight [method 1]	Transport service provider	The point at which goods arrive at the port and change of liability usually takes place from the transport service provider to the port or carrier.
Goods Departed the Port of Loading	• Actual time of departure • Vessel or Flight name/number • Actual Departure Date • Updated ETA	Transport service provider	The point at which the goods have actually left the port of loading. Confirming the transport has taken place.
Goods sold whilst in transport Rec24 status code 75 (Consignee	• Commercial document reference (invoice or other) • New buyer • New seller • Planned place of delivery	Buyer/seller	Some goods are sold whilst in transit, this can occur multiple times for some commodities. A new commercial transaction is established in this case which would supplement the original commercial contract information.

Changed)			
Transhipment (Relay) or transit Rec24 status code 100 (Transshipment)	• Means of transportation ID • Vessel or flight number • Time of transhipment • Location of transhipment • Updated ETA	Transport service provider	Transhipment is the transfer of the goods to another vessel while in transit. A transit point for air is an intermediate stop through which the goods pass and continue on toward final destination. The consignment may be unloaded and loaded onto another aircraft or just stay on the same conveyance. Generally, the consignment remains on the same mode of transport with the same transport service provider. For some modes of transport this could lead to a 'split consignment' where the goods may be separated into partial consignments and moved on a different conveyance number.
Transfer	• New carrier • Means of transportation ID • Vessel or flight name or number • Time of vessel change • Location of vessel change • Updated ETA	Transport service provider	The point at which the consignment changes onto another vehicle/vessel/aircraft, usually on the same mode of transport, but liability changes to a different transport service provider. For some modes of transport this could lead to a 'split consignment' where a partial consignment is transferred and moved on a different transport service provider's conveyance.
Import clearance procedure, including temporary storage and transit Rec24 status code 128 (Awaiting Import Release)	• Intended usage of the goods (commercial or not) • Customs value • Customs destination (direct import, storage, transit, special procedure) • Customs origin (according to importing-national legislation) • Authorization numbers (such as storage facility authorization number) • Authentication (of the declarant taking legal responsibility of the information)	Declarant	The point where the required customs declaration for import or other cross-border regulatory procedure takes place. Much of the information necessary for this output waypoint will be originating from previous input waypoints, however some additional information will probably be required.
Goods arrived at the final port of discharge	• Actual route taken • Actual arrival time	Transport service provider	The point at which the consignment physically arrives at the port of discharge which are then under customs supervision and possible

Rec24 status code 40 (Arrival at Port)			control.
Customs status Rec24 status codes 12 (Cleared by Customs), 17 (Customs Clearance Refused) and 379 (Cleared for Release)	• Regulatory decision (goods cleared, released, or on hold) • Time of regulatory decision	Customs or border agency	Customs or other regulatory agencies review the shipment for possible violations and value determination. A broker works to make sure the "paperwork" or ideally advanced data is in order and if passed by all required agencies, the goods are considered cleared. This could in future be released prior to arrival if all checks are in place.
Goods departed the port of discharge Rec24 status code 365 (Gate Out)	• Actual departure time	Transport service provider	The point at which the goods have actually left the port of discharge, on another means of transport other than that on which they arrived. Depending on the Incoterm, this could also be the delivery point where the consignment changes responsibility to the consignee.
Goods delivered Rec24 status code 21 (Delivery Completed)	• Actual delivery point • Actual date/time of delivery • GPS position of delivery point • Acceptance of delivery (person) / goods receipt	Consignee or transport service provider	The point at which the consignment is actually delivered to the consignee or dispatch party under the transport contract.
Doors opened Rec24 status code 309 (Equipment Opened)	• GPS position (versus the trip plan)	Customs, border agency or delivery party	Doors opened by customs, border agency or final delivery party. The seal would be broken.
IoT alert	Alerts whenever the physical parameters change outside of set parameters • Doors opening • Shocks and vibration • Temperature • Humidity • Pressure • GPS position for geo-fence trigger	IoT or software provider	Alerts could be provided for a number of reasons such as temperature out of range, goods dropped or within a geo-fenced area.

40. Waypoints and their use for input or output could be interchangeable and the use would be defined in the specific implementation, as would the data have extracted for the required purpose. Some classic output waypoints for example could be:

Event / output waypoint	Example Type of Data	Actor / Role / Source	Description
Door closing	• Container number • Seal number • Actual date of loading • Actual place of loading • No packages • Weight / cube	Consignor or transport service provider	The point that the goods are physically loaded onto or into the main means of transport to begin the transportation. The goods may be "sealed" into a loading device such as a container or ULD.
Export declaration	• Existing export procedure data requirements (UN/EDIFACT CUSDEC, customs declaration message)	Declarant	The point at which the required customs declaration for export takes place.
After departure	• Actual country of export • Actual departure date • Carrier (if different to planned)	Transport service provider	The point at which the goods have actually left the port of loading. Confirming the transport has taken place.
Just before arrival	• ETA update • Actual arrival location (if different to schedule) • Actual ports of call (itinerary) • Port of entry (i.e. UN/LOCODE)	Transport service provider	The point at which the main means of transport is due to arrive at its intended destination or port. Could be triggered by geo-fence for IoT enabled devices, or from Automatic Identification System (AIS) data for marine transport, for example.
Import declaration	• Intended usage of the goods (commercial or not) • Existing import procedure data requirements (UN/EDIFACT CUSDEC)	Declarant	The point where the required customs declaration for import takes place.
Goods delivered	• Actual delivery point • Actual date/time of delivery • GPS position of delivery point • Acceptance of delivery (person)	Consignee or transport service provider	The point at which the shipment is actually delivered to the consignee or dispatch party under the contract.

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Recommendations and standards: Other deliverables for noting

White Paper on technical application of Blockchain to United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) deliverables – Annex

An Introduction to Blockchain

Summary

Blockchain applications are providing new ways of exchanging data in a secure manner. Many UN/CEFACT domains have expressed an interest in applying blockchain technology to the standards they develop. In 2017, the Bureau decided to launch a single blockchain project in order to provide a harmonized framework on how each project team should approach Blockchain. The result was a project that aims to develop two White Papers. The first on the possible impact of blockchain technologies on UN/CEFACT deliverables, the second on the potential use cases of blockchain in the supply chain and beyond.

Both white papers are currently under development. This current document is Annex of the first white paper and is an explanation of blockchain technology for lay persons. The remainder of the draft of the first white paper will be presented as an informal document (ECE/TRADE/C/CEFACT/2018/INF.1).

This document is presented to the 24th session of the Plenary for information.

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Annex

I. Blockchain - How it works

1. At its heart, blockchain is a cryptographic protocol that allows separate parties to have shared trust in a transaction because the ledger cannot be easily falsified (i.e. once data is written it cannot be changed). This security is due to a combination of factors including the cryptography used in a blockchain, its consensus/validation mechanism and its distributed nature.

2. This annex does not aim to provide an in-depth review of blockchain technology - there are plenty of web resources to help readers achieve that goal. Rather, it will cover the core concepts which are needed to understand the potential application of blockchain in international supply chains.

3. First, some nomenclature:

- **Node**: System that hosts a full copy of the blockchain ledger.
- **On-chain transaction**: Automated procedure that creates or updates the state of an address in the blockchain database by appending new data to the ledger. Examples include digital asset exchange, or execution of an automated business process.
- **Validation**: Work performed by all nodes in parallel, that verifies transactions using a consensus algorithm. Different networks may use different consensus algorithms. When mutual validation results in a consensus, then the nodes all commit (record) the transaction onto their blockchain.
- **Block**: Data that is appended to the ledger by consensus. Once a block is written to the chain, it cannot be changed or deleted (without replacing all subsequent blocks).
- **Hash**: Fixed size, unique cryptographic fingerprint of data. A hash is a one-way function; this means that given the data, one can easily verify that the hash is the correct one for that data. However, it is not possible to reverse-engineer the hash, so you cannot use it to re-create the data. This is a key feature because it allows users to confirm that no changes have been made. For example, even an additional space or empty line in a text would change its hash.

4. An important characteristic of blockchain systems is the way consensus allows users to trust that transactions have been executed and trust information about those transactions (for example, their date and content). As a result, blockchain systems can be used as an independent umpire in processes that might otherwise expose participants to the risk of one party not living up to its contractual obligations (counterparty risk) and third party guarantors are reluctant to intervene and assume part of that risk. In the case of public blockchains, the umpire is the society of all nodes that choose to participate in the consensus. In the case of private blockchains, the umpire is the consortium of nodes trusted to (given permission to) create consensus on the network.

A. It's a distributed ledger

5. Ledgers are a kind of database, kept digitally or with paper records, where transactions are recorded once and not subsequently updated (also known as a journal database). Each record can be read many times but written only once. The term ledger comes from accounting where entries, once written into a ledger (accounting journal), cannot be changed.

6. A blockchain is described as distributed because there are multiple copies which are kept on different nodes. The multiple copies are updated in a coordinated way that ensures they remain consistent, using a consensus algorithm (of which there are many). Specifically, the consensus algorithm decides (by mutual agreement between the nodes) which block is added to the chain next. In essence, a blockchain database is a sequence of data blocks that have been added in a specific order, by consensus of the network operators, to each of multiple copies of the ledger and where each block contains a fingerprint (hash) that can be used to verify the content of all the previous blocks.

B. It writes transactions

7. Each block of data written to the ledger contains at least one or many records of transactions. A familiar example of a transaction would be "debit one coin from account A, and credit one coin to account B", although many other kinds of transactions are possible. Some blockchains support a limited sub-set of transactions (operations or algorithms), such as this simple double-entry bookkeeping operation. Some blockchains support a much wider set of transactions covering any solvable algorithm (i.e. a Turing-complete computer programming language[1]). These types of transactions are variously called smart-contracts, chain-code, transaction families, or other, equivalent terms. In summary, all blockchains support a variety of data operations on their chains, but not all blockchains support Turing-complete transaction languages.

C. To a cryptographically signed block

8. Blockchains implement two kinds of cryptographic technology: hash functions and public/private key cryptography. Hash functions are used to construct the fundamental proof that links each block to the rest of the chain before it. Hashes, in a different context, can also be used to provide proof of validity for data that is referenced by blocks. Public/private key cryptography is used for identifying transactors and controlling access to data. An analogy is e-mail where the public key is your email address (which others can use for sending messages to you) and the private key is your password which gives access to the private material which is your messages. So, on a blockchain, a public key can be used, for example, to implement a transaction that sends a document or a payment to a party, but only the party with the private key can access those documents or payments after they are sent.

D. That independent nodes must verify

9. There are various consensus algorithms used by different blockchain systems. For example, Bitcoin uses proof of work algorithms which allow miners to recover the cost of computationally expensive work in exchange for transaction fees. Permissioned ledgers use a consortium of collectively trusted (but not necessarily individually trusted) nodes to agree on the output of a consensus process, which are generally cheaper and faster than Bitcoin's proof of work. All consensus processes require a mechanism to settle disputes, or

[1] Turing complete programming language is capable of solving any mathematical problem computationally (if you know how to program it). In general, this means it must be able to implement a conditional repetition or conditional jump (while, for, if and goto) and include a way to read and write to some storage mechanism (variables).

uncertainty, about which block should be written next. Most of these mechanisms are based upon using the block which is agreed upon by more than 50% of the nodes.

10. The nature of the consensus mechanism determines some key characteristics of a blockchain system. For example, Bitcoin has deliberately made mining (the creation of blocks) expensive. This protects the blockchain by making the cost of capturing more than 50% of the nodes (the number needed to approve a block, and thus to manipulate the blockchain) prohibitively expensive. To compensate for this cost, miners are rewarded both an amount of Bitcoin for each block they create and fees for each transaction written to the blockchain[2]. Each block has a size limit and transaction costs are determined on a free market basis, so the more transactions are requested, the more the price increases for each transaction. This is necessary for the Bitcoin economic operating model, which seeks to obtain an honest consensus in an unregulated market of potentially anonymous and economically rational operators (i.e. operators who might, being anonymous, and having no costs for doing so, steal assets). As an additional incentive, if a node/miner does not accept the block voted on by over 50% of the other nodes, it is, effectively, kicked off the blockchain, thus losing the possibility of earning future Bitcoins and transaction fees. As a consequence, Bitcoin has extremely low bandwidth (due to the cost of generating blocks) with transactions taking more than 10 minutes to be confirmed. In addition, its very large number of nodes and users (generating large amounts of data), together with its block size limits, makes storing data on the Bitcoin blockchain expensive as well as being inefficient (given the duplication of information across all nodes, it is generally inefficient to store significant amounts of data on any public blockchain). Bitcoin still supports many billions of US dollars worth of Bitcoin and other high-value transactions, but its speed and volume limitations make this blockchain unsuitable for many enterprise applications.

11. Permissioned ledgers strike a different balance between bandwidth, capacity and trust. For example, because they have more control over who participates, permissioned ledgers can use other consensus mechanisms, even if some of them are somewhat less robust than the proof of work used by Bitcoin. For examples, there are consensus mechanisms based on the amount a node has invested in a network (called proof of stake), or where a consensus by a subset of nodes is verified by a larger group. In addition, there is a great deal of research going on to identify and test a range of other consensus mechanisms. Using these alternative consensus mechanisms, some permissioned ledgers can support hundreds or even thousands of transactions per second (rather than an average of one new block per 10 minutes, as with Bitcoin) and petabyte scale databases.

E. The block is written to the ledger after it is verified

12. When consensus is reached (which includes agreeing that a block contains legitimate data, and that it is the block that should be written next), each node adds the agreed block to their local copy of the ledger. In this way, all nodes maintain an identical copy of the ledger each time a block is written. This is guaranteed (proven) by the next block to be written, because it will contain a hash of the block before it.

F. The new block is linked to previous blocks - creating immutability

13. Recall that a hash is a one-way function that produces a unique fingerprint of some data. Also note that a hash function produces a fixed-size fingerprint regardless of the

[2] Bitcoin is designed so that, over time, mining rewards are reduced with the objective of eventually having all mining rewards come from transaction fees.

amount of data being hashed. For example, there is no way to know from looking at the hash if the data was a single small document or a database holding many billions of records.

14. Each block in a blockchain contains some transaction data, plus the hash of the previous block (which is always the same size, no matter how much data it represents). Given a consensus that this new block forms part of the chain, it is possible to verify the previous block from its hash. And from the previous block, the block before it, and so on all the way to the first (or genesis) block in the chain. The hash of the previous block is said to be anchored in the subsequent block.

15. Tampering with the contents of any block in the chain will change the hash of that block, which will change the hash of the block after it, and so on for every subsequent block in the chain. If this occurs then the tampering is easily detectable by any node, and the consensus algorithms will prevent new blocks from being written to a chain because the hashes don't match.

16. This characteristic is the origin of the word "chain" in "blockchain" because each block is anchored to the previous block and proves the existence of all the data it references going back to the first "block" of data in the "chain".

II. Blockchain - Types

A. Public Ledgers

17. Public ledgers can be read by anyone. They are also permissionless in the sense that anyone can participate and utilise consensus mechanisms without depending on a regulator to enforce acceptable behavior. Bitcoin, Ethereum and more than 10 other cryptocurrencies with market capitalization over USD 1B operate this way, allowing any transaction that is logically valid even between anonymous parties.

18. One of the fears about blockchain technology is that, if a malevolent actor were to control a majority of the nodes, then they could decide to reach a consensus in contradiction of the interests of other stakeholders. This threat is described as a Sybil attack in the cryptographic literature. A successful Sybil attack on a public blockchain cryptocurrency could result in a catastrophic redistribution of assets or double spending. Public ledgers are designed to operate according to rules that do not require governance or regulatory mechanisms to intervene in order to prevent antisocial transactions, because those mechanisms might themselves be exploited for antisocial outcomes, for example, if they were to be hacked by a third party or abused by the trusted regulators. These systems operate with absolute trust in their algorithms and are designed to avoid any need to trust any counterparties. This is why (public) blockchains are sometimes referred to as being trust-less.

19. Public ledgers typically compromise other aspects of performance in order to achieve strong resistance to Sybil attacks. They also rely on the transparency of the public ledger, and also on the transparency of the open source software involved.

B. Permissioned/Private ledgers

20. Like conventional (operational/analytic) databases, the contents of a private blockchain ledger may be a guarded secret that is only available to selected users (and node operators) through a role-based access control mechanism. Unlike a traditional database, a

private blockchain ledger is immutable (cannot be updated) and transactions are verified by a consensus mechanism that is established by the network operators.

21. Private ledger technology is typically applied in enterprise use-cases where immutable transactions are required, that can be verified by a closed community of nodes. These nodes may be independent of parties to the transactions on the blockchain and may be subject to oversight and governance that is not possible (or considered desirable) in a permission-less blockchain system.

22. Permissioned ledgers operate with a different threat model to the public ledgers. The operators of permissioned ledgers are not anonymous, they are subject to some kind of governance controls and are collectively trusted by the users. Antisocial behaviour of a node or participant could result in that party being evicted from the network, and their transactions blocked or even rolled-back from the blockchain by consensus of the remaining operators. The expectation of users of a permissioned ledger is that the operators will intervene in antisocial behaviour but not commit antisocial behaviour themselves.

23. On permissioned ledgers, the level of security, and so the confidence users can have in the immutability of the data, varies depending upon the rules established for that permissioned ledger (including its consensus mechanism). Permissioned ledgers can also create a false sense of security because only trusted participants are allowed to maintain nodes and participate in verification. At the same time, even trusted participants can become untrustworthy upon being hacked; permissioned ledgers with single points of failure are vulnerable should anything happen to that single point, and poorly tested smart contracts can create bad consequences for participants – even if no harm was originally intended, and especially if the blockchain network does not have adequate controls in place.

C. Interledger: implementing transactions across blockchains

24. Today, many different blockchains exist and, in the future, there will be even more. Already, a supply chain transaction, from beginning to end, could involve writing or reading data from multiple blockchains. In addition, it is easy to foresee an increasing need for the exchange of information and the implementation of transactions across blockchains (i.e. interledger).

25. As mentioned earlier, blockchains can reference data outside of that blockchain. This includes data in other blockchains as well as non-blockchain systems. There are two broad categories of external data references that can occur in a blockchain system: linked data and blockchain-spanning transactions.

26. Linked data uses hashes and may also use digital identifiers and public key cryptography (as long as it is used consistently across the blockchain and whichever system the linked data is stored on). This implies that the more standardized the use of public key cryptography, the easier and less expensive it will be to link data – and the same can be said for the semantics defining the data.

27. Extrinsic blockchain references (also known as anchors) can be used to prove the existence or unchanged nature of the data pointed to. This is different from a hyperlink or Uniform Resource Locator (URL) on the Internet where the information at an address may change depending on the time it is accessed. For example, if you click on a link on a television news website, which changes on a regular basis as it is updated, what you find tomorrow may be different than what you find today. With a blockchain anchor data link, the information in the blockchain is a guarantee (proof of existence) that the data being pointed to has not been changed.

28. As well as linking data between two blockchain systems (cross-chain references) and pointing to data that may be used by a smart contract (for example a test certificate), linked data can also be used to incorporate off-chain big data into a space-constrained blockchain system. Supplementary data can either be in public/open distributed data systems such as InterPlanetary File System (IPFS – an open, content-addressable memory that uses standard internet protocols), or it may reference data in private databases that are selectively available to permissioned ledger users. With private off-chain or cross-chain references, it is possible for network operators to know that some data exists, but to have their access limited by additional controls. This can be very interesting from a privacy standpoint as it is possible to access data in order to know that, for example, someone is over 21, without giving their age, or that they live in London, without giving their address.

29. Inter-ledger (blockchain-spanning) transactions use cross-chain references and components (e.g. smart-contracts) on both blockchains that interact in a coordinated way. This is an emerging field, however there are mechanisms that already exist and are in use. These are primarily focussed on exchanging value (digital assets) between ledgers, for example Ripple interledger and the Lightning Network.

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White Paper on Women in Trade Facilitation

Summary

Women face key challenges in international trade and participating in the facilitation of international trade. This White Paper takes an academic approach to identify these challenges and scans the literature for concrete measures to help rectify disadvantages or discriminations women might face.

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I. Introduction

1. The goal of this white paper is to identify ways to address gender inequality in trade facilitation. In line with the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) strategy, this paper seeks to contribute to the achievement of United Nations Sustainable Development Goal 5 (SDG5): to reduce gender inequalities and empower all women and girls. Specifically, UN/CEFACT is committed to facilitating trade and attaining gender equality within the scope of its activities, which are the simplification, standardization and harmonization of procedures and associated information related to the movement of goods from seller to buyer, and related payments.

2. This paper is part of UN/CEFACT's gender mainstreaming efforts which look to create deliverables that provide support for policy development, data creation and research, standards, recommendations, advocacy and dialogue, resource allocation, planning, implementation, and monitoring of programs aimed at eliminating gender disparities in trade facilitation. These efforts should enable women to have a greater engagement in international trade, promote their economic empowerment and ensure that trade procedures are equally accessible for women in terms of time and costs.

3. Data provides evidence that there is a need to support women in trade. Implementation of the World Trade Organization's Trade Facilitation Agreement (WTO TFA) offers great opportunities to countries for improving their competitiveness. At the same time, gender disparities reduce the gains that can be achieved in terms of international trade opportunities, countries' competitiveness, and economic growth. Organizations such as the World Trade Organization (WTO), the International Trade Centre (ITC), UN Women and The World Bank are shedding light on the fact that gender equality matters as an instrument for economic development through international trade activities.

4. Specifically, in the context of UN/CEFACT activities, gender discrimination in trade facilitation has multiple dimensions. Inequalities exist in many different areas, in multiple sectors and affect a myriad of fields of knowledge. This prevents the integration of women into international trade. It is widely recognized that gender inequities exist in three main areas: women in the economy (as entrepreneurs and participants in the labour force), women as policymakers and women as decision makers. There are also distinct barriers for women by sector and in the professions involved in trade and reflected in UN/CEFACT's Buy-Ship-Pay model. These include professions such as marine and air pilots, truck drivers, crane operators, vessel traffic services operatives, stevedores, harbour masters, traders, port managers and customs agents. Gender inequities are also ingrained in multidisciplinary areas, which involve the integration of many fields of knowledge. The reduction of gender inequalities requires the cooperative contribution of lawyers, economists, sociologists, finance experts, statisticians, engineers, designers, doctors, anthropologists and psychologists among others.

5. Using a holistic approach, this white paper has two goals: to reduce gender inequalities in trade procedures and, more importantly, to facilitate trade for women. To this end, the scope is not merely the description of best practices for women in trade facilitation. Essentially, it provides guidance for the implementation of gender mainstreaming which includes tools, policies and implementation strategies. This paper also recognizes the need for active engagement from politicians, managers, recruiters, money lenders, economic advisors, teachers and trainers, and the whole of society to achieve these goals.

II. The dimensions of gender inequality in international trade that affect trade facilitation

6. The First World Conference on Women, in 1975, highlighted that just being a woman implies a higher risk of being poor. In many ways this conference changed the dialogue on poverty since, traditionally, economists and other scientists had analysed inequalities in terms of GDP differences between countries, ignoring the gender aspects. Recent research has found gender inequality to be an impediment to economic growth, stressing the robustness of the link between poverty reduction and gender equality (Neves and Silva, 2014, Hakura et al. 2016). Reducing gender inequality is a driver for achieving the first Sustainable Development Goal of ending poverty in all its forms everywhere. More importantly, achieving gender equality, is key to realizing human development for everyone.

7. Often impediments are explicit regulatory barriers. In a survey conducted by the World Bank, 28 out of 143 of the surveyed countries had 10 or more legal differences for men and women including inequities in registering a business, travelling outside of a country, inheriting and owning land and other productive assets, and opening a bank account (World Bank, 2016b). It is remarkable that today gender inequities are still a global phenomenon; ninety per cent of the surveyed countries had at least one policy that differentiated men and women in terms of their treatment and rights (World Bank, 2016b).

8. Reducing gender inequality in trade facilitation is a difficult task because inequalities are not strictly or explicitly declared in trade procedures. It requires a wider lens to observe inequalities for women when they try to trade abroad. The functions that women play in international trade activities can be analyzed from five different perspectives: as producers, traders, entrepreneurs, workers, and policy decision makers (Brenton, et al. 2013; Higgins 2012).

A. Women as producers

9. There are some sectors and sub-sectors that employ men and women disproportionately. As producers, women represent a large proportion of the labour force in agriculture and as small farmers. Especially in developing countries, agriculture accounts for a huge percentage of unskilled low-wage jobs for women. Women comprise the highest percentage of agricultural employees, for example the top five countries for women in agriculture are: Burundi (95,8%), Rwanda (86,7%), Mozambique (85,3%), Somalia (84,19%) and Lao PDR (83,19%) (ILO, 2017). However, in other sectors and activities such as transportation, high-level staff at government agencies and customs, or high-skilled jobs, the participation of women is particularly low (e.g. information and communication technology (24%), mobility industries (19%), and financial services (36%) (World Economic Forum, 2016)).

10. As farmers, women entrepreneurs have scarce access to services and productive resources such as land, transport, storage, credit, technical assistance, new technologies, and market opportunities. These significant challenges affect their capacity to become producers in the agricultural processing industry and, in turn, international traders (UNCTAD 2014)

B. Women as entrepreneurs

11. Despite the huge contribution of women all around the world to trade, gender disparities remain. Women are the predominant dealers and marketers of the agricultural,

aquaculture and artisanal industry in domestic markets, while long-distance trade (that involves relatively capital-intensive techniques and higher profit margins) is carried out mainly by men. There are some interconnected reasons that create this gender imbalance: unequal access to assets and resources such as capital and land; in developing countries, women have less access to basic services such as water, electricity, and basic banking services; lack of access to business development services and skills; and intra-household inequity. Institutional barriers and business practices are the main barriers for women to start, run and grow business.

C. Women as traders

12. The broad contribution of women in the primary-goods sector is, unfortunately, not reflected in activities with more economic value added such as international trade business opportunities for processed products (Tran-Nguyen and Zampetti, 2004). Evidence shows that women are often prevented from being able to exploit the results of trade liberalization, women's rights are not clearly defined, and the constraints that they face are not adequately captured in international trade policies. A significant part of women's low participation in international trade occurs because of social norms and customs (for example a low acceptance of women's physical mobility). However, part of the constraints for women to trade internationally comes in the previous stage of becoming traders, such as opening a business and/or becoming an entrepreneur.

D. Women as workers

13. Women still constitute the majority of temporary, informal, seasonal, contract labourers and low-skilled workers in trade. Thus, women represent workers that disproportionally suffer from economic crises with higher unemployment rates and greater vulnerability to job loss than men (ILO, 2009, 2016; ESCAP, 2013). More specific legislative support is needed. In fact, in 112 out of 190 countries analyzed, no law mandated equal remuneration for work of equal value for women and men, nor mandated non-discrimination based on gender in hiring (World Bank, 2016c).

14. In countries where the educational gap has been overcome, women still have difficulties to acquire technical knowledge for international trade due to barriers to professional development in the labour market. The situation described above reduces women's participation in activities related to trade facilitation such as trading, cross-border management, transportation, logistics chain management, infrastructure, information and communications technology (ICT), advisory services, etc.

E. Women as policy decision makers

15. Resolution 66/130 of the General Assembly of United Nations recognizes that the participation of women on equal terms in political reforms, in the formulation and implementation of government policy, holding public office and performing public functions at all levels of responsibilities is still far from being achieved (UN, 2011). Although the percentage of women in parliament has nearly doubled in the last 20 years, as of June 2016, only 22.8 per cent of the worldwide national parliamentarians are women (UN Women, 2017). If more women were represented in decision making processes related to trade facilitation and logistics, it could strongly encourage the removal of barriers that discriminate against women.

16. However, there is a lack of data for measuring the impact of the absence of women in trade-related policy positions. The involvement of women in trade leadership could help to foster a gender-inclusive approach that, in turn, would increase the participation of women in international trade and trade facilitation. In this respect, the engagement of more women in National Trade Facilitation Committees (NTFCs) could be the best way to support women's participation in the design and implementation of national trade facilitation policies. Women in NTFCs could also contribute to supporting the internationalization of women's Micro, Small and Medium-size Enterprises (MSMEs).

III. Vulnerabilities of informal workers and entrepreneurs

17. A large volume of trade by women is unrecorded and excluded from official reports due to informal trading activities. Factors that encourage women to participate in informal trade are: multiple taxation of goods, delays in processing trade documents, routine discrimination when applying for finance or government support (ESCAP, 2013; World Bank, 2016b), as well as high regulatory barriers to establish a firm (Babbitt, et al. 2015). For women in some countries an additional complicating factor is the need to have their husband's signature on the required papers. Another traditional cause of informality is a weak institutional environment for ensuring effective markets (De Soto, 2000; North, 1990).

18. Trade policies and institutions neglect informal traders' needs (Brenton, et al. 2013; Nikam and Tchouassi, 2010). However, institutional support is the key to making the transition from the informal to the formal sector. This could be done by reducing bureaucratic procedures, decreasing the costs of enterprise registration while increasing the benefits of becoming formal, as well as by eliminating prejudice towards women-owned businesses.

19. The International Labour Organization's Recommendation 204 (ILO, 2015) on the transition from an informal to a formal economy, recognizes the specific vulnerabilities of women, such as discrimination, gender-based violence, maternity leave, health, childcare, and retirement welfare – all requiring special protection to realize fundamental labour principles and rights. There is a large body of research on these questions by the World Bank (World Bank 2016c) and the ILO (ILO 2016a).

IV. Reducing inequality

A. Capacity building and the empowerment of women in trade facilitation

20. Capacity building offers important opportunities for empowering women to participate in trade. It should cover areas such as:

- Export and import procedures;
- Drafting export development plans;
- Logistics management;
- Developing international marketing strategies;
- Conducting export market research.

21. To empower women's participation in trade, it is useful to establish programmes that help to upgrade and diversify export opportunities and to align training programmes, certificates and standards targeted to providing equal access to trade and job opportunities.

22. Women's participation in trade policy and consultative mechanisms is an important source of knowledge, and thus of capacity building. In addition, the increased involvement of women in consultation processes between traders and governments could create many opportunities. First, such participation could help to reduce inefficiencies by improving information access for women regarding procedures of border agencies, examples of customs classification, and formalities in procedures and documentation in import and export transactions. Second, it could contribute to building social and economic networks for women by providing contacts, knowledge, experience and monitoring mechanisms, which could help other international women entrepreneurs to trade successfully.

23. Gender constraints are not limited to operational barriers. They include women's underrepresentation in occupations related to trade, such as transportation, customs authorities, border agencies, etc., especially in managerial roles. Lack of representation of women in public institutions related to trade, such as ministries, chambers of commerce, industrial associations, national trade committees, and standards and technical committees is not only a barrier to addressing discrimination in labour markets; it also limits the ability to design policies that address gender gaps in international trade.

24. The role of the public and private sectors in solving women's under-representation is crucial. Public procurement and public and private partnerships (PPPs) in international trade and trade facilitation are excellent instruments for implementing inclusive policies for women during the whole or each stage of the project, including project finance, the bidding process, and project implementation and monitoring. PPP projects should also implement gender neutral policies, international labour standards and other relevant standards for gender equality in international trade and trade procedures.

25. Additionally, the inclusiveness of women in standards and certification bodies play a big role in trade facilitation by providing valuable information to producers who wish to enter new markets. Ensuring the participation of women in the design and application of standards is valuable as they are aware of the particular problems women entrepreneurs face when trying to comply with these standards. The involvement of women will enable the identification of sectors and industries where more standards that support the economic participation of women are needed. Standards are also required to facilitate the use of the machinery and transportation systems by women, to ensure security, proper health conditions and operability. This type of standard can lead to the creation of better jobs for women in professions involved in the buy-ship-pay supply chain—jobs that are traditionally performed by men such as pilots, warehouse managers, seafarers, dockworkers, merchant shippers and maritime workers.

26. Low levels of education and high illiteracy are factors that prevent the success of women in micro-business. It has been estimated that the goods that female farmers produce have enormous potential for increased trade between African countries and with the global market (Brenton et al. 2013). International organizations such as the International Trade Center, The World Bank and ESCAP have developed specific programmes for women, guiding them to improved production techniques, training them in organic certification, standards development, and international trading. These programmes are successful in increasing exports and in achieving higher incomes for women. However, in the labour market, specific training programmes are required to provide the skills needed for women to have greater access to professions in international trade.

27. Besides the above-mentioned constraints, women have limited access to ICTs, which impair them as users and as human resources in the labour market. The gender gap in ICTs is large: men are 2 to 7 times more likely than women to work in the sector, and 7 to 6 times more likely to be in ICT occupations (World Bank, 2016d). Over 1.7 billion women in low and middle-income countries do not own mobile phones, and in those countries women are 14 per cent less likely to own a cell phone than men. Access to

Internet for African women is 50 per cent less likely than for men (World Bank, 2016d). The unbalanced access to ICTs is a major problem that limits the participation of women in trade facilitation and their chances to succeed in entrepreneurial activities. Mobile phones and Internet facilitate access to information on prices, standards and regulations as well as to services such as banking, health, and education. Information technology can also be extremely helpful in building a solid distribution network, making it easier to find new buyers and suppliers. It also gives access to online training and workshops. E-education platforms provide access to education, skills and the training needed to start and run a business for women (UNCTAD, 2014). Online platforms can also offer women opportunities to promote their business, develop market channels, create networks with customers and business partners and gain access to business support services (UNCTAD 2014). An example of a tool that brings together employment and agency for female entrepreneurs and customers is SheTrades run by the ITC. SheTrades is a platform and a mobile application that helps women entrepreneurs all over the world to showcase their products, share information about their companies, connect with new buyers, and consequently expand and internationalize their businesses (ITC, 2016b). Through SheTrades, women are empowered individually and collectively to access better services, gain their voice and promote collective actions in the business arena.

B. Designing services for women to facilitate trade

28. Female entrepreneurs face obstacles during the start-up process and while running their businesses. Most women-owned enterprises do not get financial support from banks at the start-up stage. The majority of women rely on reinvested profits and personal savings (WIGB-UNIMELB, 2015). Women have limited access to bank loans due to the lack of collateral. Discrimination in access to finance restricts the growth of women-owned firms and forces them to remain in the informal sector. Studies indicate that female entrepreneurs have less access to credit from banks and financial institutions than their male counterparts (Babbitt et al., 2015). Moreover, in most rural areas banking infrastructure is non-existent, which forces women to travel to cities to conduct banking transactions and access banking services. Besides being a time-consuming process, travelling with cash entails the risks of mugging, theft and death (UNCTAD, 2014).

29. New financial products must be developed, and new methods to measure risks should be broadly implemented for supporting and extending credit services and improving access to financing for women in international business. The design of new credit instruments for women is crucial to reduce the spiralling effects of high informality and the limited access to assets for women. Traditionally, credit is linked to credit history and the use of assets as collateral. To facilitate access to finance for women entrepreneurs, a new market orientation from the finance sector is required. New financial instruments linking credit accessibility with cash flow and business opportunities instead of assets, is a successful and real solution to this trade barrier (e.g. Access Bank in Nigeria, DFCU in Uganda, Sero Lease and Finance in Tanzania). Based on these principles, the ITC and financial services providers facilitate loans for any client with productive activity, with minimal documentation requirements and flexible collateral. These services are accessible through mobile phones (ITC, 2015). The non-profit Women's World Banking is another great example of an organization that offers tailored services for women. The organization launched a breakthrough project in Colombia, Paraguay and Peru to alleviate women's financial needs by providing individual loans based on cash-flow analysis (Women's World Banking, 2017). In Africa, indirect payment systems through mobile phone service providers not only make finance transactions cheaper and faster, they eliminate the physical transportation of cash, which can be risky in rural areas. The use of mobile money in developing countries is growing and has already yielded results like time savings,

efficient logistics and better recordkeeping for payments (UNCTAD, 2011). Specifically, in international trade, the application of computerized payment systems at the border in Ghana has ensured that women have more efficient and transparent transactions at customs than they would have dealing face-to-face with border officials—improving the security of the transactions and the security of the women themselves (ITC, 2015).

C. Data to support decision making

30. A generation of more information about women is needed to know and monitor the role of women in trade facilitation. Indeed, the existing challenges for gender statistics in trade facilitation are rooted in the need for increased collection of gender-differentiated statistics based on concepts that are relevant to measuring and monitoring the Sustainable Development Goals of the United Nations (IAEG-SDG, 2016a) and the role that women play in business, entrepreneurship, international trade, government and civil society.

31. The collection and analysis of data with respect to gender in trade facilitation has hitherto been scarce for the following reasons:

- New concepts about women first need to be defined in order to use them as instruments to measure gender gaps;
- Gender indicators are scarce (IAEG-SDG, 2016b);
- The international standards for measurement and data collection are irregular (IAEG-SDG, 2016b);
- Data sources for gender are very limited and require greater integration of actual national statistics systems, alongside technologies, to have deeper access to remote and poor areas, disadvantaged women and/or indigenous settlements.

32. Gender disaggregated data in international trade and trade facilitation indicators could help to identify and monitor the following:

- The difficulties women face in the fulfilment of export and import requirements;
- The value and quantity of international trade managed/owned by women;
- The difficulties in paying fees and charges imposed on exports and imports; getting prior information about rules and procedures for trade; and accessing expedited or preferential trade procedures;
- The level of women's involvement in trade communities and trade consultation processes;
- The impact on women of trade institutions ruled by good governance and impartiality.

D. New concepts related to women, entrepreneurship and work (paid and unpaid)

33. If the activities of women are within the informal sector, the social and economic recognition of their value is underestimated. For example, in developing countries, water procurement and transportation are often carried out by women, not only to feed families, but also as a basic resource for small artisanal industries such as the pottery, agriculture, and apparel industries. New concepts are needed to separate and evaluate the paid and

unpaid work of women and to accurately account for female labour and female entrepreneurship.

34. It would be extremely useful to produce standard definitions and criteria for key terms (e.g. "woman-owned enterprise", "woman-managed enterprise" and "female state trade enterprise") and then identify the indicators and data to be collected in order to monitor/evaluate women's participation in trade and the trade barriers that women face.

35. There is no consensus in the literature or in policy papers for the name or concept of women-owned business/enterprise and there is no standard definition—which implies that when countries and organizations collect information on women-owned enterprises or firms, these statistics may be based on slightly different definitions, thus making them non-comparable and reducing their usefulness. For example, the National Women's Business Council in the United States defines women-owned businesses as 'businesses in which women own 51 per cent or more of the equity, interest, or stock of the business"(National Women's Business Council 2012) while there are some other organizations that set the minimum threshold of women's participation at 100%, for classification as "a women's enterprise"(ITC, 2016a). At the same time, even if a woman is the owner of a business, her decisions could still be influenced or even dictated by male representatives of her family, co-workers or the gendered culture of a board of directors. A more concise definition of women-owned business is issued under the United States Small Business Act (2013) which requires that "a business must be at least 51% unconditionally and directly owned and controlled by one or more women". The same principle of accounting for both ownership and control when determining women-owned enterprises has been cited for increasing the participation of women in public procurement (ITC, 2016a). The creation of a uniform definition across various entities and organizations would help to develop eligibility criteria for different programmes aimed at women-owned enterprises. Standard definitions for requirements are critical to ensure equal opportunities for all enterprises applying for programmes.

E. Trade facilitation metrics for women

36. The inclusion of the gender dimension in performance indicators in trade facilitation is needed. The main challenges to data generation are:

- The lack of consistent and comparable measurement across countries and/or the regular and systematic country production of data;
- The lack of international standards to allow comparisons;
- The complexities that hamper the generation of metrics across domains, such as cost to export/import for women entrepreneurs, percentage of female firms with a bank loan/line of credit, and percentage of exports done by female firms lack of granularity (sizeable and detailed datasets are needed to allow for disaggregation by characteristics). See the recommended metrics from the UN/CEFACT 28th Forum (Bernal-Turnes & Sarr, 2016).

F. New approaches for policymakers and practitioners to facilitate trade for women

37. There is strong recognition that more efforts are needed to convert international labour standards into laws and policies. In countries that already have developed labour codes in line with international labour standards, quite often priority has been given to the formation of policies, particularly in countries that have freedom of association, wages,

working time, labour contracts, occupational safety and health, industrial relations, pension plans and maternity protection (ILO, 2016b). It must be emphasized that when creating laws, labour standards and policies to facilitate gender equality, these measures alone have not been sufficient to ensure human rights for women.

38. A multidisciplinary perspective on inequalities for women in trade facilitation and, in particular, the relationship between policies, is critical to reducing trade barriers for women. Part of the complexity of the problem comes from a lack of coordination between various policy perspectives. Some examples of policy areas where coordination could improve results for women are:

a. Demand-side considerations such as macro- and microeconomic environments, foreign direct investment, and sectoral policies to encourage employment (ILO, 2016b);

b. Supply-side considerations (e.g. the development of marketable skills) (ILO, 2016b);

c. Control over and access to productive resources (ILO, 2016b);

d. Policies for small and medium enterprise development for women (ILO, 2016b);

e. Labour market policies (active and passive labour market policies, employment services); equal opportunity and treatment in employment; social protection and labour rights; work-life balance considerations (ILO, 2016b);

f. Issues surrounding unpaid work (ILO, 2016b);

g. Standards at work designed to increase the inclusiveness of women;

h. Measurement, analysis and monitoring of the activities of women in international trade as workers, producers, traders, and entrepreneurs.

39. Actions to address gender inequalities are often stuck between existing policies designed to protect women's rights and the application of policies which perpetuate existing gender gaps. One way to address this situation is by stressing implementation, and not only the design of policies. Women's empowerment and gender equality are needed to create changes in mental models and beliefs, dispel myths, and to improve social acceptance (World Bank, 2016e). This thinking is based on a new field of knowledge called Behavioural Economics (Kahneman and Tversky, 1979, 2000) and founded on psychology and social behaviour. In contrast to classic economic theories that assume rational decisions, this theory assumes that systemic irrationalities exist. Acknowledging this, the following implications should be considered in the design and testing of recommended policies for gender equality:

a. Humans are biased in assessing information (Kahneman, 2003, World Bank, 2016e, Todd and Gigerenzer, 2000). Not deliberately, but automatically societies often behave as gender blind, without acknowledging that this can sometimes disadvantage women. Policymakers can try to improve the decisions that people make by simplifying crucial information which encourages inclusiveness for women (e.g. mentioning the potential of women to increase global economic growth);

b. Humans are biased in decision-making (World Bank, 2016e, Pallais, 2015). Policymakers can fight against gender inequalities by influencing possible actions by making the default choice (when there are multiple options) one that supports gender equality and/or women's welfare. For example, setting the «default option» to one which creates equal opportunities to have a job interview, or

participate in a bidding process or a training initiative (Feigenberg, Field, and Pande 2013);

c. Humans behave as member of groups (World Bank, 2016). Policymakers can take into account social norms to better achieve policy objectives by fostering pride in gender equality in trade and trade facilitation; creating social rewards such as status and recognition (Besley and Ghatak 2008; Kosfeld and Neckermann, 2011); celebrating summits, conferences and strategic partnerships (Larson, and Shevchenko, 2010); building statistical indicators and rankings (World Bank, 2016e); creating symbols and logos for the identification of entities that are gender equal in training, hiring and promoting; creating channels and using the media to give voice to the entities and leaders that support gender equality and lead the creation of social behaviour, break stereotypes, and increase interactions and social networks.

40. In addition to the previous recommended policies rooted in Behavioural Economics, some traditional policy activities, which will help to achieve gender equality in trade facilitation include:

a. Incorporate gender aspects into the scope of trade agreements;

b. Encourage countries to create and internationally harmonize best practices and take measures such as global reporting on performance in order to strongly encourage the regular production of data from a gender perspective;

c. Create best practices and regulations, which reflect women's concerns in trade-related legal frameworks statistics, and professions such as transportation;

d. Create standards that take into account women's physiognomy for machinery commonly used in professions related to international trade (for example in warehouses and seaports);

e. Develop and harmonize concepts and terminology such as "woman-owned enterprise", "woman-managed enterprise" and "female state trade enterprise" to enable the analysis of data from a multidisciplinary perspective (e.g. environmental perspective of women in trade, taxation of international female firms, cost and time to trade abroad for female firms);

f. Prepare data to support the creation of gender-sensitive macroeconomic policies, programmes and social services for women;

g. Establish a harmonized national measurement and monitoring mechanism for women in trade and transport (UN/CEFACT, 2017);

h. Develop a legal framework and rules to ensure equal opportunities and rights for women in business, politics, public and private partnerships and procurement, as well as equal access to assets and inheritance, employment, salaries, education and training, technologies, promotions, management opportunities, health and retirement and government representation;

i. Ensure the full participation of women in trade and the economy by reviewing the status of implementation of the "Recommendations on Women in the Economy" found in the "United Nations Beijing Declaration and Platform for Action" (UN, 1995) and develop action plans for implementing any measures which have not yet been taken;

j. Develop new mechanisms to create a business environment for women which facilitates business registration and licensing, better access to credit, and guidance to trade abroad for women-owned businesses;

k. Encourage mutual collaboration and consultation among trade unions, business associations, women entrepreneurs and policy officials to facilitate trade for women;

l. Strengthen social and labour protection schemes for female workers and firms;

m. Use PPPs to target women in the provision of public and private services related to trade.

V. References

Babbitt, L.G.; Brown, D. and Mazaheri, N. (2015). Gender, Entrepreneurship, and the Formal-Informal Dilemma: Evidence from Indonesia. *World Development*, vol. 72, (August), pp. 163-174.

Bernal-Turnes, P. and Sarr, D. (2016). Main Inequalities for women. Mini-Conference about Women in Trade Facilitation, The United Nations Centre for Trade Facilitation and E-business XXVIII Forum, 26 September 2016, Bangkok, Thailand. Available at: http://www.unece.org/fileadmin/DAM/cefact/cf_forums/Bangkok_2016/PPTs/MiniConf_Women_in_TF_Presentation_Bernal.pdf (Accessed 10 February 2018).

Besley, T. and Ghatak, M. (2008). Status Incentives. *American Economic Review*, vol. 98, No.2 (May), pp. 206-11.

Brenton, P.; Gamberoni, E. and Sear, C. (2013). *Women and Trade in Africa: Realizing the Potential*. Washington, D.C. The World Bank. Available from: https://openknowledge.worldbank.org/bitstream/handle/10986/16629/825200WP0Women00Box379865B00PUBLIC0.pdf?sequence=1 (Accessed 10 December 2017).

Cross, J.C. (2000). Street Vendors, Modernity and Postmodernity: Conflict and Compromise in the Global Economy. *International Journal of Sociology and Social Policy*, vol. (February) pp. 29–51.

Davis, K., and others (2012). *Governance by Indicators: Global Power through Classification and Rankings*, vol. 1. Oxford: Oxford University Press.

De Soto, H. (2000). The Mystery of Capitalism. Basic Books. New York.

Djankov, S., and Ramalho, R. (2009). Employment Laws in Developing Countries. *Journal of Comparative Economics*, vol. 37, (October), pp. 3-13.

ESCAP (2013). *Asia-Pacific trade and investment report 2013. Turning the tide. Towards inclusive trade and investment*. Bangkok. 2 October. E/ESCAP/CTI(3)/1.

Feigenberg, B., Field, E. and Pande, R. (2013). The Economic Returns to Social Interaction: Experimental Evidence from Microfinance. *Review of Economic Studies*, vol. 80, No.4 (October), pp. 1459–83.

Hakura, D., Hussain, M.; Newiak, M.; Thakoor, V.; Yang, F. (2016). Inequality, Gender Gaps, and Economic Growth: Comparative Evidence for Sub-Saharan Africa. IMF Working Paper. Available from https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Inequality-Gender-Gaps-and-Economic-Growth-Comparative-Evidence-for-Sub-Saharan-Africa-43946 (Accessed 18 February 2018).

Higgins, K. (2012). *Gender Dimensions of Trade Facilitation and Logistics, A Guidance Note*. Washington, D.C.: World Bank. Available from http://siteresources.worldbank.org/INTRANETTRADE/Resources/Pubs/Gender_Dimensions_Trade_Facilitation_Logistics_Higgins_electronic.pdf (Accessed 10 December 2017).

IAEG-SDG (2016a). Fourth meeting of the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) held in 5 to 18 November 2016 in Geneva, Switzerland. Available from http://unstats.un.org/sdgs/meetings/iaeg-sdgs-meeting-04 (Accessed 10 December 2017).

IAEG-SDG (2016b). *Provisional Proposed Tier Classification for Global SDG Indicators Inter-agency and Expert Group on Sustainable Development Goal Indicators* (IAEG-SDGs). 21 September 2016, Geneva. Available from: http://unstats.un.org/sdgs/files/meetings/iaeg-sdgs-meeting-03/Provisional-Proposed-Tiers-for-SDG-Indicators-24-03-16.pdf (Accessed 10 December 2017).

ILO (International Labour Organization) (2009). The price of exclusion: the economic consequences of excluding people with disabilities from the world of work. Employment Working Paper, No. 43. Available from http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_119305.pdf (Accessed 10 December 2017).

ILO (2015). *Recommendation (204) concerning the transition from the informal to the formal economy*. Geneva. Available from http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_377774.pdf (Accessed 10 December 2017).

ILO (2016a). *Application of International Labour Standards 2016 (I) International Labour Organization*. Geneva. Available from http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_448720.pdf (Accessed 10 December 2017).

ILO (2016b). Key Indicators of the Labour Market database. Geneva. Available at: http://www.ilo.org/global/lang--en/index.htm (Accessed 18 February 2018).

ILO (2017). ILOSTAT database. Available at https://data.worldbank.org/indicator/SL.AGR.EMPL.FE.ZS (Accessed 18 February 2018).

ITC (2015). *Unlocking Markets for Women to Trade*. Geneva. Available at: http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/women_in_trade_web.pdf (Accessed 10 December 2017).

ITC (2016a). *Empowering women through public procurement*, pp. 15-17. Available at http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Women%20procurement%20guide-final-web.pdf (Accessed 20 November 2017).

ITC (2016b). SheTrades. ITC, Geneva. Available https://shetrades.com (Accessed 22 February 2018).

Kahneman, D. (2003). Maps of Bounded Rationality: Psychology for Behavioural Economics. *American Economic Review*, vol. 93, No. 5, (December) pp. 1449–75.

Kahneman, D. and Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, vol. 47, No. 2, (March), pp. 263–91.

Kahneman, D. and Tversky, A. (2000). *Choices, Values, and Frames*. Cambridge, U.K.: Cambridge University Press and Russell Sage Foundation.

Kistruck, G.M., and others (2015). The Double-Edged Sword of Legitimacy in Base-of-the-Pyramid Markets. *Journal of Business Venturing*, vol. 30, No. 3, (May), pp. 436–451.

Kosfeld, M. and Neckermann, S. (2011). Getting More Work for Nothing? Symbolic Awards and Worker Performance. *American Economic Journal of Microeconomics*, vo. 3, No. 3, (June), pp. 86–99.

Larson, D.W., and Shevchenko, A. (2010). Status Seekers: Chinese and Russian Responses to U.S. Primacy. *International Security*, vol. 34, No. 4, (Spring), pp. 63–95.

Loayza, N.; Oviedo, A.M. and Serven, L. (2005). The Impact of Regulation on Growth and Informality: Cross- Country Evidence. Policy Research Working Paper, No. 3623, Washington, D.C.: World Bank.

National Women's Business Council (2012) https://www.nwbc.gov/content/survey-business-owners-nwbc-calculations-methodology (Accessed 22 February 2018).

Neves, P.C., and Silva, S.M.T. (2014). Inequality and Growth: Uncovering the Main Conclusions from the Empirics. *The Journal of Development Studies*, vol. 50, No. 1, (November), pp. 1–21.

Nichter, S. and Goldmark, L. (2009). Small firm growth in developing countries. *World Development*, vol. 37 No. 9, (September), pp. 1453–64.

Njikam, O. and Tchouassi, G. (2011). Women in Informal Cross-border Trade: Empirical Evidence from Cameroon. *International Journal of Economics and Finance*, vol. 3, No.3, (August).

North, D.C. (1990). Institutions, institutional change and economic performance. Cambridge University Press, New York.

Pallais, A. (2015). Small Differences That Matter: Mistakes in Applying to College. *Journal of Labor Economics*, vol. 33 No. 2, pp. 493-520.

Sharma, S. (2009). Entry Regulation, Labor Laws and Informality. Working Paper, No. 48927, Washington, D.C.: World Bank.

The World Bank (2016a). Enterprise Surveys. Washington, D.C. Available from https://www.enterprisesurveys.org/ (Accessed 10 December 2017).

The World Bank (2016b). *Doing Business, 2017. Equal opportunity for all*. Washington, D.C. Available from http://www.doingbusiness.org/reports/global-reports/doing-business-2017 (Accessed 10 December 2017).

The World Bank (2016c). Women, Business and the Law 2016 database. Available at: http://wbl.worldbank.org/data/exploretopics/all-indicators. (Accessed 10 December 2017).

The World Bank (2016d). *World Development Report. Digital Dividends*. Washington, D.C. Available from http://www.worldbank.org/en/publication/wdr2016 (Accessed 10 December 2017).

The World Bank (2016e). *World Development Report. Mind, Society and Behavior*. Washington, D.C. Available from http://www.worldbank.org/en/publication/wdr2015 (Accessed 10 December 2017).

Todd, P.M. and Gigerenzer G. (2000). Précis of Simple Heuristics That Make Us Smart. *Behavioral and Brain Sciences*, vol. 23, No. 5, (November), pp. 727–41.

Tran-Nguyen, A. and Zampetti, A.B. (2004). *Trade and Gender: Opportunities and Challenges for Developing Countries*. New York/Geneva: UNCTAD.

UN/CEFACT (2017). Recommendation 42. Trade and Transport Monitoring Mechanisms. Available at: https://www.unece.org/fileadmin/DAM/trade/Publications/ECE_TRADE_437E_Rec42.pdf (Accessed 12 February 2018).

UNCTAD (2014). *Empowering Women Entrepreneurs through Information and Communications Technologies. UNCTAD Current Studies on Science, Technology and Innovation, No. 9*. New York/Geneva: United Nations. Available at:

http://unctad.org/en/PublicationsLibrary/dtlstict2013d2_en.pdf (Accessed 10 December 2017).

United Nations (1995). Beijing Declaration and Platform for Action, paragraphs: 165-172. Available at: http://beijing20.unwomen.org/~/media/headquarters/attachments/sections/csw/pfa_e_final_web.pdf#page=107 (Accessed 19 February 2018).

United Nations (2011). Resolution 66/130 of the General Assembly of United Nations. 19 December. A/68/184. Available at: http://www.un.org/ga/search/view_doc.asp?symbol=A/68/184&Lang=E__(Accessed 10 December 2017).

UN Women (2017). *Facts and figures: Leadership and political participation*, http://www.unwomen.org/en/what-we-do/leadership-and-political-participation/facts-and-figures. PARLINE database: http://www.ipu.org/parline-e/parlinesearch.asp. (Both accessed 10 December 2017).

Webb, J.W. and others (2013). Research on entrepreneurship in the informal economy: framing a research agenda. *Journal of Business Venturing*, vol. 28, No. 5, (September), pp. 598–614.

World Economic Forum (2016). *The industry gender gap: Women and Work in the Fourth Industrial Revolution Executive Summary*, Geneva. Available from http://www3.weforum.org/docs/WEF_FOJ_Executive_Summary_GenderGap.pdf (Accessed 10 December 2017).

WIGB-UNIMELB (2015). Women, global trade and what is takes to succeed. Women in Global Business. Available at: https://minerva-access.unimelb.edu.au/bitstream/handle/11343/145370/FINAL%20WIGB_MLB_Uni_Report_2015.pdf?sequence=5 (Accessed 18 February 2018).